COMMERCIAL FISHERIES Review

VOL. 30, NO. 1 JANUARY 1968

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COVER: Fur seal herd being driven along a Pribilof island in Bering Sea, about 300 miles off Mainland Alaska.

The seals come ashore in late May-early June before snow has melted. The young are born each summer. In the fall, after breeding season is over, seals return to sea.

The Alaska herd, an estimated 80% of world's fur seals, has about $1\frac{1}{2}$ million animals. Since 1939, about 69,000 skins have been taken each year. (Photo: V. B. Scheffer)

COMMERCIAL FISHERIES

Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.

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The Bureau of Sport Fisheries and Wildlife
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Throughout this book, the initials BCF stand
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Indians carrying bags of salmon along Columbia River. (Photo: USIA in National Archives)

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U. S. AND USSR AGREE ON SOVIET FISHING OFF U. S. MID-ATLANTIC COAST

On Nov. 25, 1967, the Soviet Union and the United States reached a 1-year Agreement on Fishery Problems in the Western Areas of the Mid-Atlantic Bight. These are the waters extending from Cape Cod. Mass., to Cape Hatteras, North Carolina.

The Soviet Union agreed to reduce its fishing effort. The U. S. agreed to permit Soviet fishing in a limited area within the 9-mile contiguous zone of the U. S. off Long Island--and Soviet loading in a limited area off New Jersey when it would not conflict with U. S. sport and commercial fishermen.

The 12-member U. S. delegation was headed by Ambassador Donald L. McKernan, Department of State, and included representatives of industry, Coast Guard, and the Bureau of Commercial Fisheries. The Soviet delegation was led by Vladimir M. Kamentsev, First Deputy Minister of Fisheries, and included 10 officials of the Soviet Ministry of Fisheries. The U. S. experts consider the 1-year accord an experimental step in international fisheries agreements.

McKernan's Statement of Problems

In explaining the problems of U. S. fishermen, McKernan pointed to the sharp declines in U. S. landings of red hake during the past 3 years. In southern New England fishing ports, landings of red hake decreased from 59.4 million pounds in 1965 to 10.8 million in 1966--down 81 percent. He said: "As far as U. S. fishermen are concerned, this important fishery has virtually disappeared, with severe economic consequences for the Americans. Landings of whiting or silver hake remain far below what we consider normal. Our studies indicate that abundance has diminished to a remarkably low figure." Other fisheries causing concern are scup, fluke, and other flounders.

McKernan concluded: "The United States remains one of the strongest supporters of the concept of freedom of fishing on the high seas with reasonable regard for the interests of local coastal fishermen in areas where distant-water fleets operate . . . . We must show by concrete example to the nations of the world, whose coastal fishing is adversely affected by high-seas fisheries, that they can cooperate with nations conducting these high-seas fisheries in reaching mutually satisfactory solutions and that in fact such solutions are preferable to drastic actions of a unilateral nature. I think that our two countries have been the leaders in recent times in reaching cooperative solutions to common fishery problems."

WHAT AGREEMENT PROVIDES

- The Soviet Union will refrain from fishing during Jan. 1 to April 1, 1968 in a large rectangular area about 46.5 miles wide and over 100 miles long south of the eastern half of Long Island. The area encompasses about 4,600 square miles. This will permit large concentrations of Atlantic red hake and whiting to reach their spawning grounds undisturbed.

[Some U. S. scientists believe the Soviets have been intercepting hake on the high seas where they concentrate early in the year before moving inshore. This limitation on Soviet fishing should provide U. S. fishermen a somewhat greater access to this resource and may alleviate their present economic difficulties.]

• The Soviet Union will not increase its 1968 catch above 1967 catches in the Mid-Atlantic Bight south of sub-area 5 of the International Convention for the Northwest Atlantic Fisheries (ICNAF) and north of Cape Hatteras. These are the waters west of meridian 71°40' as far as Cape Hatteras; meridian 71°40' runs across Block Island south of Rhode Island coast.

[This measure will bring some relief from increasing foreign fishing pressures on U. S. inshore fisheries. Intensive Soviet offshore fishing has resulted in increasing catches of species important to U. S. coastal fisheries.]

In addition, the Soviets will not conduct "specialized fisheries" for scup (porgy) and fluke in the Mid-Atlantic Bight. Also, they will not increase the incidental catches of those species.

[In the past, Soviet fleets took only small quantities of scup and fluke incidental to other catches. Because these 2 fisheries are important to U. S. commercial and sport fishermen throughout Middle Atlantic area, it was considered important to protect fisheries.]

U. S. Permits Soviet Loading

• The U. S. will allow the Soviets to "conduct loading operations" in limited areas off Long Island and New Jersey. The Soviets will be able to transfer fish catches to processing vessels or transfer supplies from base ships to fishing vessels. Access to the loading area off Long Island will be permitted from Nov. 15 to May 15. From Sept. 1 through May 1, Soviet vessels will be permitted to load or unload in a 3-mile stretch off New Jersey. The loading area off southeastern Long Island was determined during the negotiations. The one off central New Jersey was to be defined and communicated to the USSR before Jan. 1, 1968. (See map p. 3 for N. J. area selected. The area was selected to interfere least with U. S. sport or commercial fishermen.)

[Loading and unloading in protected areas close to shore is important to the Soviets. They have encountered technical problems in high-seas transfers of catches and supplies. They also will be able to repair disabled vessels quickly.]

USSR Can Fish Off Long Island

• The U. S. gives the USSR the privilege of fishing in the 9-mile exclusive fishing zone off Long Island during Jan. 1 to April 1, 1968. This is the period when Soviet vessels will refrain from fishing in the area of silver hake concentration. The area is about 10 miles long and 6 miles wide. It extends landward towards Moriches Bay from the outer limits of the U. S. 9 mile fishery zone. It encompasses about 60 square miles. A similar privilege was extended to the USSR in a small area off the Alaska coast in the Feb. 13, 1967, Agreement.

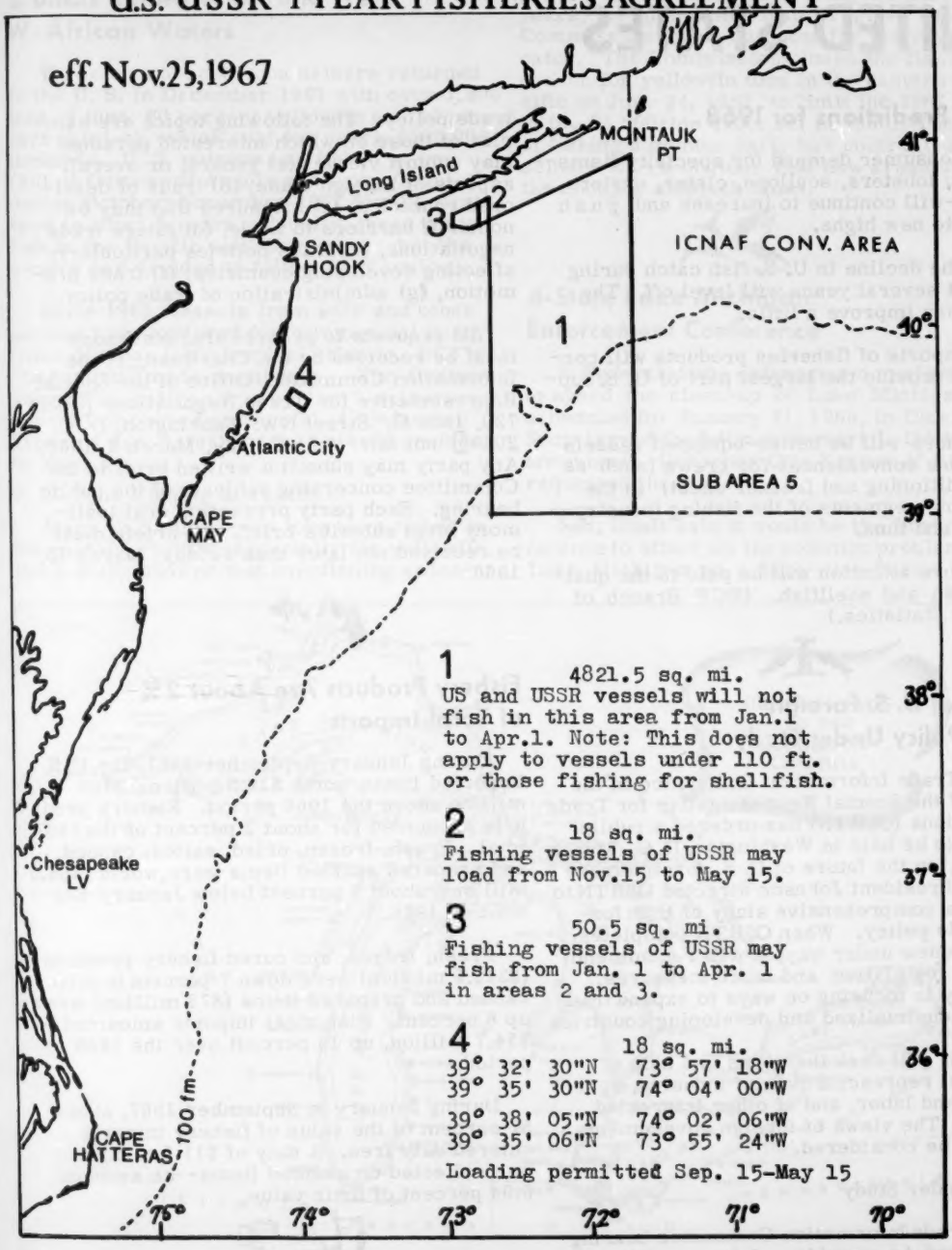
Both Nations To Expand Research

The Agreement seeks to ensure the maintenance of maximum sustainable yields from fisheries in the Mid-Atlantic Bight. The U. S. and the USSR will expand research "on species of fish of interest to both parties" and exchange scientific and research data, books, and articles. To coordinate fishery research, their scientists will meet periodically and exchange tours on research vessels.

[The investigations may provide data to evaluate Agreement's effectiveness and its potential for conservation.]

BCF and the Coast Guard jointly conduct extensive surveillance of foreign fishing vessels in U. S. waters. This service will make it possible for the U. S. Government to verify Soviet compliance with provisions of the "Atlantic Agreement."

U.S.-USSR 1-YEAR FISHERIES AGREEMENT



1 4821.5 sq. mi.
US and USSR vessels will not fish in this area from Jan.1 to Apr.1. Note: This does not apply to vessels under 110 ft. or those fishing for shellfish.

2 18 sq. mi.
Fishing vessels of USSR may load from Nov.15 to May 15.

3 50.5 sq. mi.
Fishing vessels of USSR may fish from Jan. 1 to Apr. 1 in areas 2 and 3.

4 18 sq. mi.

39° 32' 30"N	73° 57' 18"W
39° 35' 30"N	74° 04' 00"W
39° 38' 05"N	74° 02' 06"W
39° 35' 06"N	73° 55' 24"W

Loading permitted Sep. 15-May 15

UNITED STATES

Some Predictions for 1968

- Consumer demand for specialty items--shrimp, lobsters, scallops, clams, oysters, crabs--will continue to increase and push prices to new highs.

- The decline in U. S. fish catch during the past several years will level off. The catch may improve a little.

- Imports of fisheries products will continue to provide the largest part of U. S. supplies.

- There will be better-equipped vessels with more conveniences for crews (such as air conditioning and freezer chest) in the better-off segments of the fishing industry--shrimp and tuna.

- More attention will be paid to the quality of fish and shellfish. (BCF Branch of Fishery Statistics.)

Future of U. S. Foreign Trade Policy Under Study

The Trade Information Committee in the Office of the Special Representative for Trade Negotiations (OSRTN) has ordered a public hearing to be held in Washington, D. C., March 25, 1968, on the future of U. S. foreign trade policy. President Johnson directed OSRTN to conduct a comprehensive study of U. S. foreign trade policy. When OSRTN completes the study now under way, it will recommend required legislative and other measures. The study is focusing on ways to expand trade among industrialized and developing countries.

OSRTN will seek the views and help of Congress, representatives of industry, agriculture, and labor, and of other interested persons. The views of foreign governments also will be considered.

Topics Under Study

The Trade Information Committee hearing is designed to provide a full exposition of public views on all aspects of U. S. foreign trade policy. The following topics are samples of those on which interested persons may submit views: (a) general or overall aspects of foreign trade, (b) trade of developed countries, (c) measures that may be nontariff barriers to trade, (d) future trade negotiations, (e) trade policies particularly affecting developing countries, (f) trade promotion, (g) administration of trade policy.

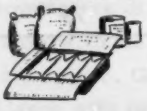
All requests to present oral testimony must be received by the Chariman, Trade Information Committee, Office of the Special Representative for Trade Negotiations [Room 729, 1800 G. Street NW. Washington, D. C. 20506] not later than Friday, March 8, 1968. Any party may submit a written brief to the Committee concerning subjects of the public hearing. Each party presenting oral testimony must submit a brief. All briefs must be received not later than Friday, March 15, 1968.

Fishery Products Are About 2% of Total Imports

During January-September 1967, the U. S. imported items worth $19.5 billion--$700 million above the 1966 period. Fishery products accounted for about 2 percent of the 1967 total. Fresh, frozen, dried, salted, canned, and prepared seafood items were worth $384.9 million--about 5 percent below January-September 1966.

Fresh, frozen, and cured fishery products ($311.9 million) were down 7 percent in value; canned and prepared items ($73 million) were up 6 percent. Fish meal imports amounted to $54.7 million, up 18 percent over the 1966 period.

During January to September 1967, about 57 percent of the value of fishery imports entered duty free. A duty of $11.5 million was collected on seafood items--an average 6.84 percent of their value.



3 Boats Return With Tuna From W. African Waters

Three commercial tuna seiners returned to the U. S. in December 1967 with over 1,500 tons of tuna, 60 percent yellowfin and 40 percent skipjack, which sold for nearly $500,000 dockside. U. S. seiners had fished in the Gulf of Guinea off Angola and Ivory Coast during October-November 1967 for the first time in about 5 years. Usually, these boats fish in the Pacific until November--but the owners had decided to follow BCF advice.

Since 1963, vessels from BCF and other nations have explored for commercial quantities of tunas in the tropical Atlantic. BCF's "Geronimo" made 6 surveys. The findings seemed to justify a trip by the 3 seiners--and the trip proved successful. ("Undaunted" departed Jan. 9, 1968, on the first of 2 cruises to West Africa.)

U. S. Tuna Fishing in Pacific

Many U. S. tuna boats long have fished in the eastern Pacific, especially for yellowfin. But a study showed that overfishing endangered yellowfin stocks. During the past few years, the Inter-American Tropical Tuna Commission has set a quota for the yellowfin catch. The Commission closed the fishing season for yellowfin tuna in the eastern Pacific on June 24, 1967, to limit the 1967 catch to the 84,500-ton quota set in 1966. The end of fishing 6 months early had confronted tuna seiners with a choice: find new areas or fish the cheaper skipjack tunas.

4-State Lake Michigan Enforcement Conference

A Federal-State enforcement conference to speed the clean-up of Lake Michigan is scheduled for January 31, 1968, in Chicago, Secretary of the Interior Stewart L. Udall has announced. Governor Otto Kerner of Illinois requested the conference.

Sec. Udall said it would be the first conference to attack all the pollution problems of Lake Michigan on a lake-wide basis. "No

resource problem in the country is more important than the saving of Lake Michigan," he emphasized.

In a telegram to Governor Kerner, Sec. Udall said: "Your request that I call an enforcement conference on the four Lake Michigan States to protect the water quality of Lake Michigan and its drainage basin reflects your long recognized leadership in the field of natural resources. I consider the saving of Lake Michigan so important that I am planning to attend and open the Federal four-State conference." Sec. Udall will serve as chairman.

He said formal notifications of the conference were mailed to the States involved: Illinois, Indiana, Michigan, and Wisconsin.

Problems Facing Conference

The participants will look at all pollution problems threatening Lake Michigan. These include "inadequately treated municipal and industrial wastes; dumping of dredged material into Lake; sewage and refuse discharged from commercial and pleasure boats; overenrichment of the water by phosphates and other nutrients; oil pollution; thermal pollution; alewives and lampreys, and bacteriological pollution that forces closing of beaches along the lakefront."

An enforcement conference in 1965 dealt with only part of the Lake. A conference report indicated that discharge of untreated or inadequately treated sewage and industrial wastes into Lake Michigan, the Grand Calumet, Little Calumet, Calumet River, Wolf Lake, and their tributaries endangered the health and welfare of residents in Illinois and Indiana.

Since then, it became evident to those concerned that solution of the pollution problems of Lake Michigan and its tributaries requires a combined drive by the 4 bordering States, the cities, and the U. S. Government.

U. S. and Romanian Experts Will Exchange Visits

The U. S. and Romania have agreed on a program of exchanges and visits for 1968. One part of the program will be a 3-month visit to the U. S. by 3 Romanian fisheries experts to observe and train with personnel of the Bureau of Commercial Fisheries (BCF).

During the training period, BCF scientists will be able to board a Romanian factory stern trawler working on Georges Bank to study fishing and fish-processing techniques.

The agreement also includes visits to Romania by experts from the Bureau of Sport Fisheries and Wildlife and the National Park Service of the U. S. Department of the Interior.

Alewife Mortality in Lake Michigan Will Continue

Scientists of BCF's laboratory in Ann Arbor, Mich., recently completed an annual survey of alewives in Lake Michigan. They found the adult population very numerous despite millions of deaths in 1967. The severe problems caused by alewives in some Great Lakes can recur in spring and summer 1968.

Dr. Stanley A. Cain, Asst. Secretary of Interior for Fish and Wildlife and Parks, said very large hatches of alewives in 1964 and 1965 produced the current abundance. Dr. Cain heads a task force studying the problem. He said the hatch during summer 1967 also was very large. Alewives in the Great Lakes become very susceptible to mass death when 3 or 4 years old.

Task Force Report

A task force report said the phenomena of mass fish deaths have occurred since the late 1950's and that Lake Michigan's entire fish population is unstable. The mortality probably will continue in Lake Michigan as in Lakes Ontario and Huron so long as alewives predominate. The report recommended research to produce a better balance among species. Controlled introduction of desirable predators and successful commercial use of alewives may be answers to alewife abundance.

The report also noted: "The expense of cleaning up and hauling away dead fish imposed severe financial losses this summer

[1967]on cities and towns bordering Lake Michigan. The West Michigan Tourist Association estimated that resort owners lost more than $50 million, and some private owners were forced to abandon their vacation sites."

Recover Many Tagged Columbia River Chinook Salmon

During the latter part of 1967, there was good recovery from commercial and sport catches of marked adult fall chinook salmon produced in Columbia River Fishery Development Program hatcheries. Through September 9, 4,678 marked fish were recovered from northern California to Alaska. Biologists and technicians from the State fisheries agencies and BCF cooperated in examining 20-25 percent of the fish landed at various Pacific coast ports. Canadian fisheries personnel helped the program on a voluntary basis.

Of the recoveries, 4,150 were from commercial catches; about 46.5 percent of them were from British Columbia. As the season progressed, a larger proportion of marked fish was recovered in the Columbia River catches and at the hatcheries. A complete tabulation should be available shortly after Jan. 1, 1968.

Pacific Shellfish Sanitation Workshops Well Attended

Workshops organized to stress the importance of good sanitation practices in the shellfish industry were sponsored recently in Eureka, Calif., and Newport, Oregon, by the Food and Drug Administration in cooperation with the states. More than 100 management and plant workers from Pacific coast shrimp and crab plants attended each meeting.

Congress and regulatory agencies have shown interest recently in overall processing sanitation. BCF technologists participated in the workshops.

Task Force Studies Overfertilization of Lakes

The government-industry group investigating ways to control overfertilization of lakes (eutrophication) will develop a procedure to determine how much various chemicals and waters contribute to the growth of algae.

Eutrophication is the natural aging process of lakes. It causes trouble when the addition of nutrients, mainly phosphates, speeds the process. Phosphates are a common element in municipal sewage, human waste, agricultural fertilizers, detergents, and industrial discharges. Nitrates too contribute to the problem.

Man Adds Nutrients

The activities of people add more nutrients to the lakes and the aquatic plants increase and die. Organic deposits rise from the lake bottom. "The lake becomes shallower, smaller, warmer, and organic decay depletes the supply of oxygen." Over the centuries, the lake becomes a marsh and, eventually, disappears. Lake Erie is an example of seriously accelerated eutrophication in the U. S. There, algal growths occur with increasing frequency. Obnoxious slimes and odors prevail. Parts of the lake bottom have no oxygen at all. The value of Lake Erie for recreational purposes is threatened seriously.

Seeking Answers

The task force considers the development of a procedure to determine algal growth potential (AGP) of various chemicals and waters an important first step in fighting eutrophication. Algal blooms on lakes can be a sign of accelerated eutrophication, but there is little agreement among scientists on a best or "standard" technique to measure a lake's capacity to grow algae--and the tendency of chemicals to stimulate algal growth.

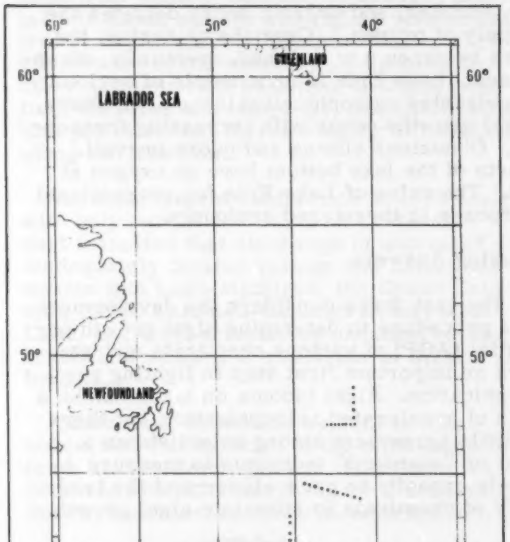
In its search, the task force is consulting scientists at the Federal Water Pollution Control Administration laboratories, technical personnel from industry, university experts, independent research institutions, and private specialists.

OCEANOGRAPHY

Grand Banks International Ice Patrol

On March 28, 1968, the U. S. Coast Guard vessel "Evergreen" will begin the first of 4 consecutive 30-day oceanographic cruises to the Grand Banks. The main purpose of these cruises will be to collect data to support the iceberg drift prediction requirements of the International Ice Patrol. The secondary purpose will be a study of the structure and migration of the semipermanent eddy at the Tail-of-the-Banks, delineate the cold core of the Labrador Current, and continue the investigation of iceberg drift and deterioration in this region.

Temperature and salinity data will be collected by Nansen casts and/or automatic Salinity-Temperature-Depth system from the surface to 1,500 meters at each station along 3 standard monitoring sections. (See chartlet.) Temperature data also will be obtained by Expendable Bathythermographs (XBTs). All data collected will be processed at sea by digital computer.



A recording temperature sensor will be placed in the cold core of the Labrador Current for about two months to study time changes in the current. The sensor will be anchored in 3,000 feet of water on a tautline moor.

"CGC Evergreen is equipped to make precision depth measurements, dissolved oxygen determinations, collect bottom sediment samples, and collect and preserve water samples for subsequent special chemical constituent determinations."

Buoy Beaming Data to Ships

The U. S. Naval Oceanographic Office now has an undersea radioisotope generator to power an oceanographic buoy platform that will beam scientific data to ships, planes, and satellites. The buoy platform contains an Interrogation Recording Location System. It is an experiment to determine the feasibility of finding and obtaining scientific surface data from ocean platforms by unmanned satellites. It is one of the experiments being conducted in connection with the Nimbus-B weather satellite program.

The radioisotope generator is a 25-watt undersea model produced commercially. Attached to a taut wire moored buoy 250 feet beneath the Atlantic Ocean's surface, the generator will supply electrical power to the Interrogation-Recording-Location-System (IRLS) surface spar float.

Moored Off Puerto Rico

Sensors will be put on the buoy platform, moored off the coast of Puerto Rico, to make environmental measurements--sea states, ocean currents, wind velocities, etc. The IRLS transmitter will telemeter the data from a specially designed antenna mounted atop the spar float. As the Nimbus-B satellite passes overhead twice a day, it will interrogate the platform and store the data for

later playback as it crosses a central ground command station at Fairbanks, Alaska.

If the IRLS experiments prove successful, similar unmanned scientific data collection stations using radioisotope power could be placed at remote spots throughout the world. Their data, plus that from orbiting satellites, will provide a modern technique for data collection and telemetering for oceanography. They also will permit precise global location of data stations without sophisticated navigational aids.

Coast Guard and BCF Cooperate to Aid ICNAF Research

The U. S. Coast Guard and BCF are conducting cooperative oceanographic cruises to support the research program planned by ICNAF (International Commission for the Northwest Atlantic Fisheries). The 2 U. S. agencies are studying the offshore resources fished by the United States and other member nations of ICNAF. The aim of the international program is to understand natural fluctuations in abundance of commercial fishes and to assess the effects of fishing. BCF's Biological Laboratory in Woods Hole, Mass., is coordinating U. S. efforts.

From Jan. 15-Jan. 26, 1968, the Coast Guard's Boston-based "Evergreen" conducted an environmental survey of Continental Shelf waters between Nova Scotia and Long Island. The hydrographic data collected will supplement earlier data collected in the same area by BCF's "Albatross IV." During the Evergreen's cruise, the Fisheries Research Board of Canada's "Cameron" conducted a similar survey in the Bay of Fundy and Scotian Shelf area.

What Evergreen Did

At each station occupied, a Salinity-Temperature-Depth recording instrument (STD) was lowered, plus a Nansen bottle cast to obtain water samples to determine dissolved oxygen and chlorophyll. Also, drift bottles were released--and seabed drifters at stations shoaler than 275 meters. Water temperature profiles were obtained at about 43 locations along the trackline by Expendable Bathythermograph System (XBT).

The Evergreen's regular crew was increased by a Coast Guard Oceanographic Unit Field Party of Oceanographers and Oceanographic Technicians.

Studied Cape Cod to Cape Hatteras

From Dec. 11-22, 1967, the Evergreen conducted an intensive hydrographic survey of coastal waters between Cape Cod., Mass., and Cape Hatteras, North Carolina. Thirty-four stations were occupied. The hydrographic data collected will be used to evaluate groundfish surveys conducted in the same area by BCF's Albatross IV and the Soviet's "Albatros."

Results of these cruises will appear in joint BCF-CG post-cruise documents. They will become part of the report on the cooperative U. S.-USSR Middle Atlantic Study.

Oceanographic Projects Continue at 4 N. Atlantic Stations

Oceanographic projects are continuing at the 4 North Atlantic Stations--"Bravo" "Charlie," "Delta," and "Echo"--manned by U. S. Coast Guard Cutters. The stations are occupied on a 3-week patrol basis.

The oceanographic program consists of time-series observations of temperature and salinity. Nansen casts are made daily to 1500 meters depth. Once during the 3-week patrol, casts are made to near bottom, if weather and other operations permit. Observations are made at 14 or 15 depths. The temperature data are transmitted by radio teletype to the U. S. Coast Guard Oceanographic Unit for real-time processing, quality control, and distributed to users. Salinities are determined at sea by inductive salinometers. Occasionally, other oceanographic observations are made on request--biological sampling, collection of samples for chemical analysis, bathymetry, wave-height measurements, etc.

Foreign Fishing off U. S. Coasts in November 1967

IN NORTHWEST ATLANTIC

During November 1967, 46 individual foreign fishing vessels--from Poland, East and West Germany, and the Soviet Union--fished off New England. Weekly sightings noted fleets of 30 to 35 vessels; not all stayed the entire month.

Early in November 1966, only about 15 Soviet vessels fished on Georges Bank, then dwindled to an occasional few by month's end; there were no Polish or German vessels.

Polish: Poland continues to lead in number of foreign vessels off New England. Throughout November, 30 individual vessels were identified as 4 freezer stern trawlers, 23 large side trawlers, 1 factory base ship, and 2 supply vessels.

Early in month, 28 Polish vessels were scattered along eastern slopes of Georges Bank. Moderate catches observed on several vessels appeared to be herring and some haddock.

Fig. 1 - Polish freezer stern trawler "Albakora" (SWI-183), fishing for herring on Georges Bank, September-October 1967.

By mid-month, the fleet was reduced to about 20 along southeast part of Georges Bank. The limited catches of fish on deck appeared to be scrod haddock. (U. S. vessels located slightly northwest of the Polish fleet on the winter fishing grounds of Georges Bank reported haddock fishing generally poor.)

Late in month, most Polish vessels shifted to southern New England fisheries south of Martha's Vineyard and Nantucket Island. Again, large catches of herring were observed on deck and in nets. This was the first instance of any significant activity by Polish vessels in those two areas. In the same areas in recent years, large Soviet fleets had developed an extensive red hake and whiting fishery during winter.

Several times during month, Polish trawlers were anchored or nested alongside large factory base ship and other supply vessels stationed about 22 miles southeast of Gloucester, Mass. This general area has been used during past two months for transferring fish and replenishing supplies.

Soviet: Since late October, only 5 or 6 factory stern trawlers were scattered between Georges Bank and southern New England searching for concentrations of fish. The occasional catches observed on deck appeared to be whiting. The same was observed during November 1966.

East German: One freezer stern trawler was observed fishing among vessels of other nations south of Martha's Vineyard and Nantucket Island during second part of November. Large catches of herring were observed.

Fig. 2 - East German freezer stern trawler (ROS. 705). Name and vessel class unknown. Sighted Georges Bank October 1967. Large catch of fish believed herring.
(Photos: Resource Management, BCF, Gloucester, Mass.)

West German: Early in month, 5 to 7 freezer stern trawlers fished east of Cape Cod (Great South Channel). By month's end, fleet increased to 10 and shifted operations south of Martha's Vineyard and Nantucket Island. Heavy-to-moderate catches of herring were observed. Like the Poles, this is first time West Germans fished off southern New England.

On Nov. 24, the freezer stern trawler "Eric Ollenhauer" entered Boston Harbor to pick up supplies at Everett, Mass. A BCF resource management agent visited vessel. He reports that it had been midwater trawling about 50 feet off bottom for herring on Georges Bank. Catches were excellent, averaging 20 to 30 tons per tow; some tows yielded up to 50 tons. The captain said 15 West German vessels were fishing Georges Bank during the latter part of November. He thought more might be coming because fishing was excellent. The catch is unloaded at St. Pierre et Miquelon Islands because there are no fish transports or motherships

in the area. The 40-man stern trawler is equipped with the latest electronic devices, including a "netsonde machine" (a recorder showing depth of trawl and amount of fish entering the net).

IN THE GULF OF MEXICO

No foreign vessels were sighted off U. S. during October.

OFF CALIFORNIA

Soviet: During November, number of vessels fluctuated greatly. No sightings were reported during first half but, by mid-month, 7 vessels were fishing north of San Francisco (two 20 miles west of Eel River and the rest 28 miles west of Orick, off Humboldt County). In third week, no vessels were sighted; toward month's end 7 vessels again were sighted off Bodega Head and Crescent City. Although they were in area of good shrimp beds, they were catching fish.

It can be expected that with the end of hake fishing off Pacific Northwest and beginning of stormy season in more northern latitudes, more Soviet vessels will tend to concentrate off California. A similar movement occurred in 1966 when, in the first week of December, the 60-vessel hake fleet off Oregon and Washington left; 20 vessels moved south and began fishing off San Francisco south of Farallon Islands.

No information is available on species caught off California.

OFF PACIFIC NORTHWEST

Soviet: During November, 27 to 59 vessels were sighted off Washington and Oregon. The number of fishing, support, and research

Table 1 - Soviet Fishery Vessels Sighted Off Pacific Northwest in November 1967

Week Ending	Area	Type of Vessel				Total
		Medium Side Trawlers	Stern Factory Trawlers	Support Vessels	Research Vessels	
Nov. 2	Wash.	21	3	7		31
	Oregon	1	17	3	1	22
Total		22	20	10	1	53
Nov. 9	Wash.		not available (bad weather)			
	Oregon		not available (bad weather)			
Nov. 16	Wash.	23	6	9	1	39
	Oregon	1	15	2	2	20
Total		24	21	11	3	59
Nov. 23	Wash.	1	2		1	4
	Oregon	1	18	2	2	23
Total		2	20	2	3	27
Nov. 30	Wash.			1		1
	Oregon	13	12	8	2	35
Total		13	12	9	2	36

Table 2 - Soviet Fishery Vessels Sighted Off Pacific Northwest in November 1966

Week Ending	Area	Type of Vessel				Total
		Medium Side Trawlers	Stern Factory S Trawlers	Support Vessels	Research Vessels	
Nov. 3	Wash.	31		17	2	50
	Oregon		12		1	13
Total		31	12	17	3	63
Nov. 10	Wash.	42	3	19	3	67
	Oregon	1	7			8
Total		43	10	19	3	75
Nov. 17	Wash.	40	3	15	3	61
	Oregon		1			1
Total		40	4	15	3	62
Nov. 24	Wash.	38	4	16	3	61
	Oregon		5			5
Total		38	9	16	3	66
Dec. 1	Wash.	37	1	14	3	55
	Oregon		4			4
Total		37	5	14	3	59

vessels increased during first 2 weeks to 59. In remaining two weeks, only 27-36 vessels operated off Pacific Northwest. (In November 1966, 59 to 75 vessels were sighted in same coastal area.)

Of the vessels sighted in November 1967, most were large stern factory trawlers, with a smaller number of medium side trawlers. There were the usual number of support vessels, and also 1 to 3 research vessels. This is significantly different from November 1966, when there were almost half as many large stern trawlers and more medium side trawlers. A large stern trawler (2,600-3,200 gross tons) can catch up to 6-7 times as much fish as a medium side trawler (500-700 gross tons) during same time and under similar conditions.

In November 1966, there were more processing and other support vessels; in 1967, only 9 to 11 were sighted during most of month. This means fewer support vessels are needed because larger self-supporting stern trawlers can also process fish.

During first-half November, the Soviets fished off Washington and Oregon; in third week, they switched almost entirely to Oregon; some of those vessels were heading for California.

OFF ALASKA

Soviet: Fishing continued at low level; 20 or fewer vessels fished for Pacific ocean perch.

Within Gulf of Alaska, about mid-November, 4 more factory trawlers joined 6 sistership. Major emphasis was on lower Albatross Bank near Chirikof Island where, in mid-month, 2 large stern factory trawlers (BMRT's) were joined by 5 others and a refrigerator vessel. On outer Portlock Bank east of Kodiak, one stern trawler fished throughout month. West of Yakutat Bay, 3 large stern trawlers fished during first-half November, but only one about mid-month.

There was a corresponding reduction in fishing along Aleutians during first two weeks of November, from about 12 to about 6 factory trawlers. Most apparently were fishing in Seguam-Amukta Passes region.

Japanese: Withdrawal of factory trawlers in November reduced number of vessels off Alaska to less than 10 by month's end--lowest level this year.

By month's end, 5 factory trawlers had been withdrawn from Gulf of Alaska, leaving 2 such vessels operating full time. Remaining factory trawlers operated principally west of Yakutat Bay. A second group of 4 factory trawlers appeared intermittently along southern boundary of Dixon Entrance. Apparently, it is fishing along west coast of Queen Charlotte Islands.

It is believed the typically inclement, late-fall weather also curtailed Japanese perch fishing in southeastern Bering Sea and along Aleutians. Only 1 factory trawler was working just north of Unimak Pass at month's end.

During November, at least 6 Japanese longline vessels fished for sablefish in the Alaska area: 4 of these in central Gulf near Middleton Island, 1 in western Gulf off Chirikof Island, and the sixth north of Fox Islands in eastern Aleutians.

STATES

Alaska

SPOT SHRIMP FISHERY DEVELOPS

In 1967, landings of spot shrimp (Pandalus platyceros) in the developing fishery in southeastern Alaska were 32,000 pounds. At least 20 vessels were active at some time during the year; 4 of these fished consistently since the end of the salmon season.

Explorations by BCF had found commercial concentrations of the large shrimp. BCF technologists worked on handling and processing methods. These 2 events led to the fishery's beginning.

* * *

OIL POLLUTION IS POTENTIAL DANGER TO FISH AND WILDLIFE

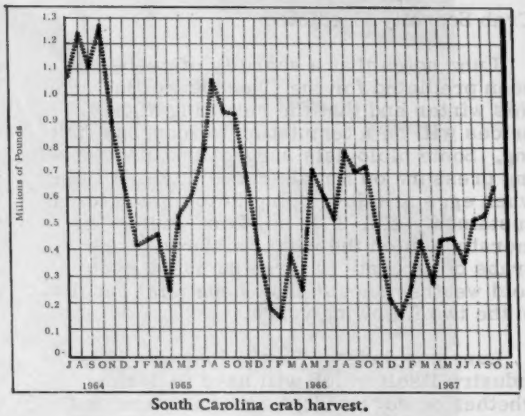
During November 1967, a combination of storms and tides pushed ducks into contact with an oil spill in Cook Inlet, Alaska. An estimated 1,800 to 2,000 ducks were killed; the Pacific eider was hardest hit.

The incident substantiates warnings by BCF, Bureau of Sport Fisheries and Wildlife, and Federal Water Pollution Control Administration against the potential danger of extensive oil pollution in Cook Inlet to fish and wildlife.

South Carolina

CRAB INDUSTRY WARNED OF ECONOMIC RUIN

In a report to the South Carolina crab industry on Dec. 1, 1967, C. Robert Lunz of Bears Bluff Laboratories on Wadmalaw Island warned the industry to protect itself from "economic ruin, an inevitable conclusion," if the production decline of recent years continues. In February 1966, he noted, Bears Bluff released a report entitled: "An Interim Report to the Crab Industry on Studies Being Made on Blue Crabs in South Carolina". The chart showed the relative abundance of blue crabs throughout the state from 1955 to 1965 and was based on data from experimental trawling. The decline of male crabs, which began in 1959, and of female crabs in 1963, caused some concern, but it was hoped these fluctuations were part of a "normal" cycle.



South Carolina crab harvest.

Since that time, however, there have been two large and widespread kills of crabs. After reviewing the commercial crab harvest month by month since July 1964, Lunz is concerned about the future of the crab industry.

A steady decline in crab production for all South Carolina producers is shown in the accompanying graph. There has been an almost 25 percent decline in harvest each year from 1964 to November 1967.

Crab kills from North Carolina down into Georgia have been studied by Bears Bluff, aided by U. S., state, and county biologists from all along the coast. The industry has cooperated. "Certainly the as yet unknown cause of these crab kills is a very important factor in the decline in the blue crab populations," writes Lunz, "but there is reason to believe that other factors are involved."

He states: "It would behoove everyone in the crab industry to exert every effort to keep intact the marshes so essential for the growth and development of crabs; to guard against pollution; and take an active part in seeing that pesticides are used with as much care as possible. Changes in marshes, increased pollution and unwise use of pesticides coupled with adverse meteorological conditions could

well be among the responsible forces causing the crab decline.

"There is some evidence to indicate that overfishing and intensive fishing pressure is not ordinarily a factor in the decline of crab populations. This evidence is not altogether conclusive. These past few years have not been 'ordinary' years in South Carolina."

Crab Scarcity Predicted

Lunz notes that a scarcity of crabs has been predicted for the Chesapeake Bay area this winter and that the resulting higher prices will be a temptation to increase fishing. Some biologists suggest that heavy fishing pressure on female crabs during winter when eggs are developing is too much for a sustained yield. If is so, Lunz writes, a moratorium on the winter fishery where crabs congregate in large numbers during cold weather should show beneficial results in the two following years.

Lunz concludes: "In the long run it is the industry itself which will have to decide whether or not to adopt a moratorium, but this letter sounds a warning to the industry and urges that all join in whatever efforts may be necessary to find answers to why crabs are declining."

Florida

ARMY ENGINEERS AID MILLIONS OF SPAWNING MULLET THROUGH OKEECHOBEE WATERWAY

Hundreds of thousands of black or striped mullet making their annual migration from Lake Okeechobee to the Atlantic and the Gulf to spawn are being helped through the locks of the Okeechobee waterway by the U. S. Army Corps of Engineers. This year's mullet run is extremely large. It started at the beginning of December 1967. More than 500,000 mullet were "locked through" the St. Lucie facility, near Stuart, Fla., on Sunday, December 3. Millions of mullet will be locked through during the following 2 to 3 months. Army Engineer locktenders work around the clock during mullet runs to get them through the boat-lift facility.

The roe mullet ranged up to 6 pounds and probably averaged about 3 pounds.

1955 A Milestone

The phenomenon of the mullet run was not fully realized until winter 1955. Before, there never had been any need for special assistance at the navigation lock during the spawning migration. But in 1955 an unprecedented mullet population swam furiously down the St. Lucie Canal, gasping for air and competing with boats to get through the lock. The regular lockages were insufficient and many mullet died.

Since 1955, Army Engineers have worked with the U. S. Fish and Wildlife Service, state biologists, and the State Board of Conservation to cooperate with the mullet run. The engineers make special lockages when necessary to get the mullet to salt water, where they deposit their eggs.

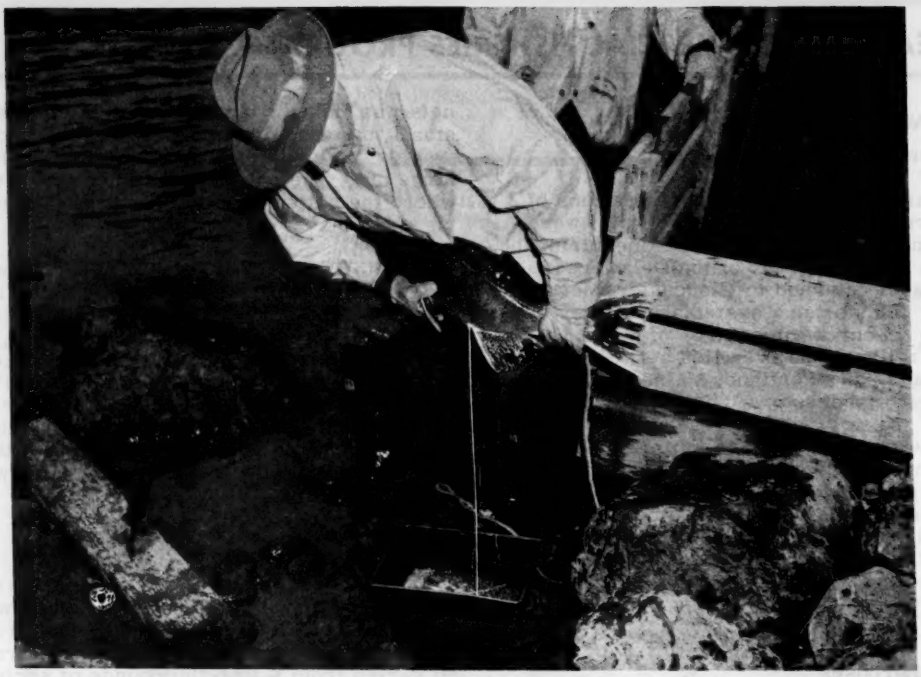
During their frantic spawning trip, the mullet rarely take a hook. But when they return to Lake Okeechobee's fresh water from the estuaries in early spring, they usually are very hungry and will take many types of bait.

Meanwhile, the engineers at St. Lucie Lock watch and wait to respond to the mullet runs. They know that wind and temperature apparently have a great effect on size and length of the run. When the wind shifts from the northwest to the east, the heavy spawning run slows to a halt.

Oregon

SALEM CITY PARK TO REAR SALMON

A 12-acre pond in Salem's Cascade Gateway Park has been selected for a pilot project that may lead to a series of ponds producing over 10,000,000 fall chinook salmon a year for release into the Willamette River, reports the Oregon Fish Commission. The Regional Parks Agency and the commission are cooperating to have 2,000,000 tiny fall chinook from one of the commission's Columbia River hatcheries released into the pond in March 1968--for eventual release into near-



Male salmon being milked of sperm. (USIA in National Archives)

by Mill Creek, a Willamette River tributary. The young salmon will be planted in the pond, fed, and liberated before public use of the park becomes heavy again in June.

If the program is successful and money available, Fish Commission biologists envision a series of ponds throughout the Willamette basin producing more than 10,000,000 small fall chinook ready to begin their downstream migration. Future pond sites have been located tentatively on the Molalla, North Santiam, South Santiam, and the main stem Willamette near Eugene.

Pond-Rearing Research Since 1961

The pilot program at the Salem park follows experimental work at the Commission's Wahkeena Pond in the Columbia River gorge. There, biologists have carried out natural pond-rearing research since 1961 under contract to the U. S. Bureau of Commercial Fisheries.

Sometime during the latter part of March 1968, 2,000,000 small fall chinook will be placed in the pond, fed the Oregon Pellet, and be released eventually into Mill Creek--to travel through the heart of Salem to the Willamette, the Columbia River, and on to the sea.

* * *

CONFERENCE ON
MARINE AQUICULTURE

A Conference on Marine Aquiculture will be held at the Oregon State University Marine Science Center, Newport, Oregon, May 23 and 24, 1968. Invited participants will present formal papers on 8 topics: fish culture, shellfish culture, behavior, genetics, nutrition, disease, economics, and engineering.

Address inquiries to: William J. McNeil, Oregon State University, Marine Science Center, Marine Science Drive, Newport, Oregon 97365.

BUREAU OF COMMERCIAL FISHERIES PROGRAMS

"Delaware" Finds Commercial Amounts of Northern Shrimp

Commercially usable concentrations of northern shrimp (Pandalus borealis) were found in the western Gulf of Maine during the 6-week shrimp survey of the Delaware (67-9). The vessel returned to Gloucester, Mass., on Dec. 8, 1967, after a systematic survey of shrimp resources in an area of about 3,600 square miles. The area lies between Cape Cod, Mass., and Portland, Maine, from 10 to 80 miles offshore.

Trawl tows were made in depths of 28 to 150 fathoms. Catches of shrimp up to 1,000 pounds per 1-hour tow were made. Count per pound (heads on) for all shrimp taken was well within the range desired for commercial use--30 to 60 per pound. This cruise was the first of several planned to complete a survey of shrimp resources in the Gulf of Maine.

Cruise Purposes

The purposes of the cruise were: (1) to locate commercially potential concentrations of northern shrimp that could be harvested during this period prior to the normal shrimping season, (2) to determine the boundary limits of these concentrations, (3) to ascertain the production potential of shrimp populations located, and (4) to collect data on the behavior and accessibility to fishing gear of northern shrimp populations.

Procedure

210 tows were made using (1) a 30-foot (headrope length) chain-rigged try-net, (2) a roller-rigged 70-foot Maine shrimp net, or (3) a chain-rigged 70-foot Maine shrimp net. When the cruise began, comparison tows were made to determine catch ratios between the try-net and the two 70-foot nets. One comparison tow was made between the roller net and the chain-rigged net; the chain net caught about 60 percent more shrimp than the roller-rigged net.

The tows were located generally at the intersection of grid lines spaced about 5 miles apart. Preliminary exploratory tows were made with the try-net. If the catch was large enough to indicate good concentrations of shrimp, 20 pounds or more, one of the larger nets was fished. If the try-net catch was small, the vessel proceeded to the next designated station without making a tow with a large net. The roller-rigged net was used where the bottom was too rough for the chain-rigged net.

The total weight of shrimp in each tow was determined by measuring the catch in bushel baskets and taking the average weight of the baskets of shrimp. Samples were taken to determine the count per pound and shrimp lengths. During the first two parts of the cruise, work proceeded around the clock; during the last part, the work period was reduced to coincide more nearly with daylight hours, when catches were somewhat better.

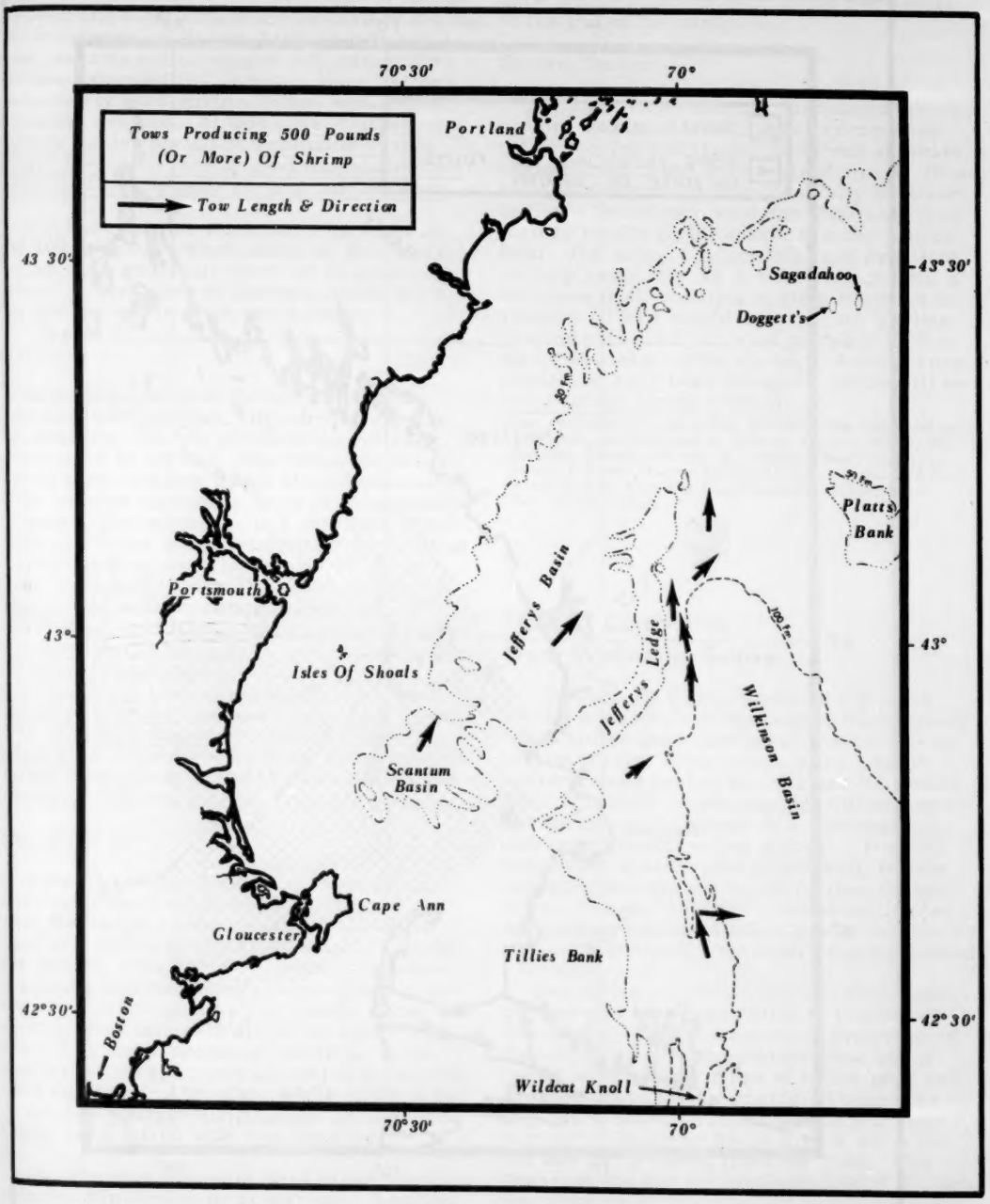
Results

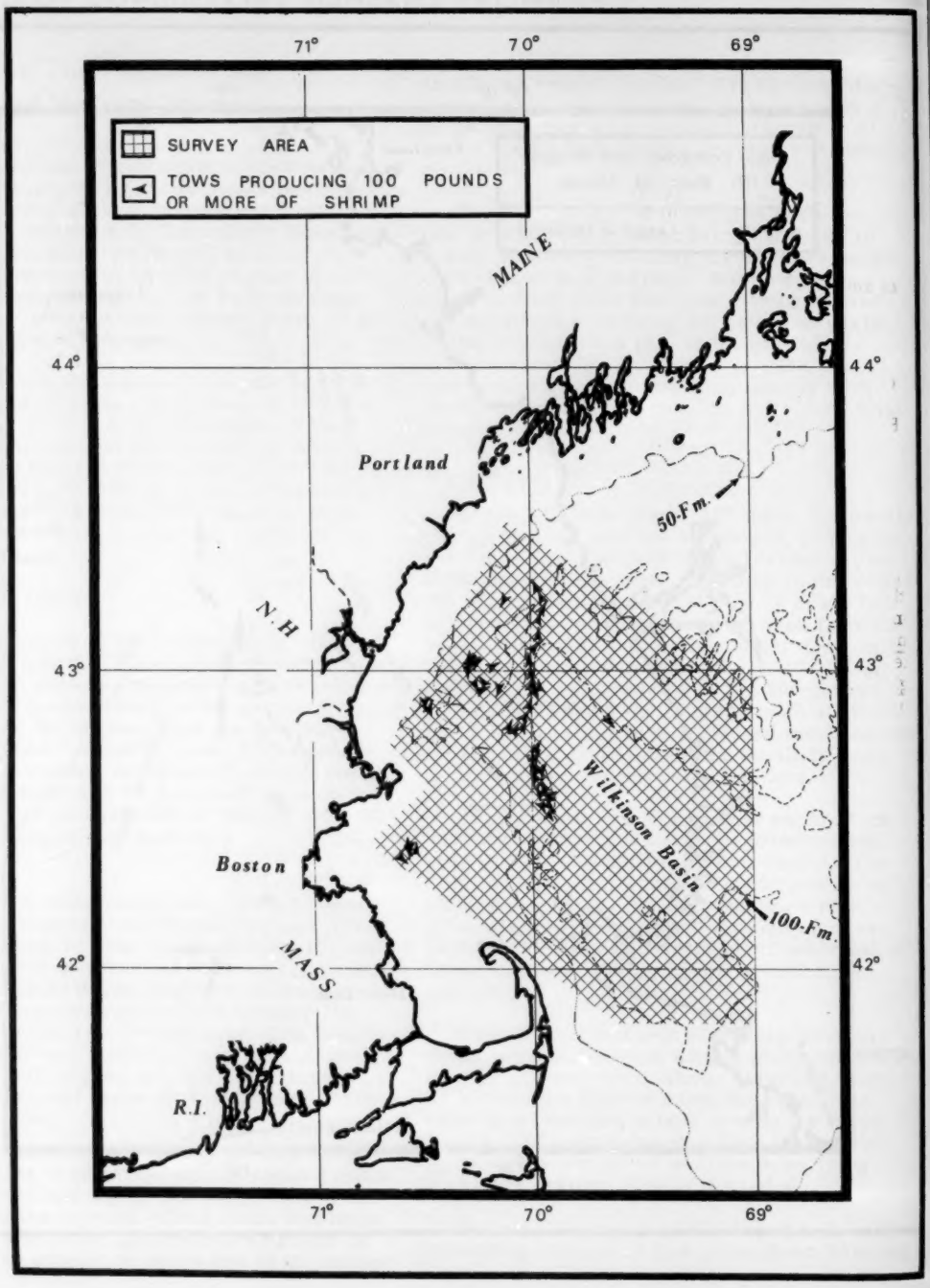
Of the 210 tows made, 137 were made with the try-net, 67 with the roller net, and 6 with the chain net. Catches in the try-net varied from zero to 55 pounds. Catches in the roller net varied from 4 to 1,000 pounds of shrimp per hour tow, and the chain net took from 23 to 400 pounds of shrimp per hour. Generally, the larger catches were taken in 40- to 110-fathom depths. Offshore of the 100-fathom contour bordering the western edge of Wilkinson Basin, most tows produced small catches of shrimp from either the small try-net or the larger commercial size nets.

Except for a small area just south of its western tip, tows made in the Middle Bank area produced generally poor results. The best catches here were about 400 pounds of shrimp per hour. All tows caught a high percentage of trash and other fish species. Separation of shrimp from other material in these catches was difficult and time consuming.

Good concentrations of shrimp were located west of Jeffreys Ledge, where up to 700 pounds per tow were taken. However, here, as around the Middle Bank, the amount of associated species mixed in with the catch makes this area somewhat less than desirable--when compared with the area lying along the eastern side of the ledge.

Starting just north of Wildcat Knoll, and extending northward to a point about 30 miles


Tows Producing 500 Pounds (Or More) Of Shrimp
Tow Length & Direction
70° 30'
70°
Portland
43° 30'
Sagadahoc
Doggett's
Platts Bank
Portsmouth
43°
Isles Of Shoals
Jefferys Basin
Jefferys Ledge
100 fm
Wilkinson Basin
Scantum Basin
Cape Ann
Gloucester
Tillies Bank
42° 30'
Boston
Wildcat Knoll


71°
70°
69°
SURVEY AREA
TOWS PRODUCING 100 POUNDS OR MORE OF SHRIMP
MAINE
44°
Portland
50-Fm.
N.H
43°
Wilkinson Basin
100-Fm.
Boston
42°
MASS.
R.I.
71°
70°
69°

south of Casco Bay, is the area that produced the best and most consistent catches of shrimp. The maximum catch was 1,000 pounds per 1-hour tow with roller-rigged net; most other catches exceeded 200 pounds. Many catches were nearly pure shrimp mixed with only a few other species. At this time, commercial shrimp fishing should be profitable in this area. The catch rate is good, the shrimp are large, and nearly pure shrimp can be taken.

The best catches were taken between 80 and 100 fathoms. When taken at greater depths, they generally were not in great abundance. In less than 40 fathoms, there were few shrimp or, in most cases, none.

Species

Regardless of area fished, all positive tows produced catches with varying species composition. No tow produced an entirely clean catch of shrimp. Starfish were prevalent in many catches in the Middle Bank area, while catches elsewhere were predominantly various finfish species. In a few tows, the catch of redfish exceeded 1,000 pounds. Most of these redfish were large size and free from "buttons,"--parasitic copepods Sphyrion lumpi. The most common finfish species taken were: cod (Gadus callarias), dabs (Hippoglossoides platessoides), gray sole (Glyptocephalus cynoglossus), haddock (Melanogrammus aeglefinus), hake (Urophycis sp.), redfish (Sebastes marinus), pollock (Pollachius virens), cusk (Brosme brosme), whiting (Merluccius billinearis). Weight per tow for these species varied from several individuals to 5,000 pounds of redfish.

Size of Shrimp

A small random sample of shrimp was taken from each catch and weighed to determine the weight/count relationship. Most smaller catches produced shrimp of 30 to 35 per pound. The larger catches, which occasionally included many younger shrimp, averaged about 40 shrimp per pound. Thus, all shrimp taken fell well within the size range desired by the processing industry. In the smaller catches, almost all individual shrimp were egg-bearing females, while in the larger catches younger and smaller shrimp generally were mixed with ripe females.

Length measurements were taken from selected samples at most stations. Lengths varied between 20 to 34 millimeters for carapace length from the back of the eye socket to the end of the carapace.

Shrimp Shaker

A small, experimental, mechanical shrimp shaker was used to help sort shrimp from other species and trash. It did not separate shrimp from trash with desired speed. However, it demonstrated successfully the basic design's feasibility and the desirability of further modifying the shaker to make it practical. By using a successful and practical shrimp separator as a basic component, a complete deck-handling system might be developed. This would incorporate shrimp-grading screens to increase possibly further the ex-vessel price for shrimp. A new shrimp separator has been designed, which will be tried during future cruises.

Note: For additional information concerning this cruise and program work associated with it, contact: Keith A. Smith, Base Director, Ernest D. McRae, Jr., Assistant Base Director, or Phillip S. Parker, Fishery Biologist, Exploratory Fishing & Gear Research Base, State Fish Pier, Gloucester, Mass., 01930. Tel. 617-283-6554.

"Cobb" Completes Gear Evaluation Cruise

The John N. Cobb completed a 3-week cruise in waters off Washington State during which roller gear configurations for use on bottom trawls, along with a warp tension system, were evaluated. (Cruise 91, ended Nov. 17, 1967.) Scuba-equipped divers observed the performance of a contemporary and experimental roller system. The contemporary system performed well, but the experimental system needs further design work. The warp tension system monitored wire strain satisfactorily. It was considered a valuable addition to the Cobb's fishing system.

One of the cruise's most valuable contributions was the presentation to commercial fishermen, through a series of drawings, of the net's actual configuration when being fished with various types of roller gear and dropper chain arrangements. These drawings were based on observations and measurements made by Scuba divers while the net was being fished from the Cobb. The drawings showed the configuration of the net, and distance of footrope and headrope above the seabed, along various sections of the net.

Objectives

The primary objective of Cruise 91 was to test the BCF Lampara trawl as a bottom net and evaluate its commercial potential. Other objectives were to evaluate an acoustic gear spread measuring system; the effect of door tilt on spreading ability; the standard BCF Universal trawl; Mark II Universal trawl; and handling characteristics and buoyancy of naturally buoyant and externally buoyed gangion twine for use in longline fishing.

BCF Lampara Trawl Evaluation

Methods: The BCF Lampara trawl was fished in coastal waters from Cape Flattery to Destruction Island, Wash., in the Strait of Juan de Fuca near Port Angeles, and in Holmes Harbor, Puget Sound. Comparative tows were made from the Cobb with a 400-mesh Eastern otter trawl. Catches with the Lampara trawl were also compared to those of a commercial trawler working the same area. The Lampara trawl was towed at similar ground speeds to the 400-mesh Eastern net; however, the 400-mesh Eastern net was towed at 240 r.p.m., while the Lampara was towed at 310 r.p.m.

Gear: The BCF Lampara trawl was constructed of 3-inch 18-thread nylon web. The net had a 200-mesh long 4-panel body, 240 meshes wide per panel at the mouth, and 40 meshes wide per panel at the junction with the cod end. The wings were 1,225 meshes long, tapering on the top edge from 0 to 240 meshes high. The headrope was a 500-foot section of $\frac{3}{8}$-inch, manila-wrapped steel cable with 130 8-inch aluminum trawl floats attached. The footrope was $\frac{1}{2}$-inch manila-wrapped steel cable 500 feet long. The net was weighted with 500 feet of $\frac{5}{16}$-inch chain hung to the footrope. A 12-foot section of $\frac{7}{8}$-inch chain was used for additional weight on each wing where towing bridle was attached. A special bridle arrangement was used to reduce variation in door attitude with changes in scope ratio by raising towing point about 3 feet above sea bed.

The 400-mesh Eastern otter trawl used for comparative tows had a 94-foot-long footrope and was made of nylon webbing with $4\frac{1}{2}$-inch mesh wings and $3\frac{1}{2}$-inch mesh intermediate and cod end; 100 feet of $\frac{1}{4}$-inch chain was hung to the footrope and eleven 8-inch aluminum trawl floats were attached to the headrope. The first 20 fathoms of the 25-fathom, $\frac{1}{2}$-inch steel bridles were single; the last 5 fathoms were double.

The trawl doors used to spread both nets were 6- by 10-foot steel V-doors made of reinforced $\frac{5}{32}$-inch plate and weighted 860 pounds each.

Results: Eleven 1-hour tows were made offshore with the Lampara trawl between Destruction Island and Cape Flattery. Two of these tows could be compared with tows made by a commercial vessel in the area; 3 others could be compared with 400-mesh Eastern tows made by the Cobb offshore and in Strait of Juan de Fuca.

Pertinent catch data:

		Comparison of Catches of Salable Fish by 2 Trawls		
Location		Lampara Trawl	400-Mesh Eastern Trawl	
Offshore	Drag 91-92	1,800 lbs./hr. English sole	Catch rate of trawler "Eagle" towing same location, direction, and speed with net similar to 400-mesh Eastern--2,500 lbs./hr.--mostly English sole.	
Offshore	Drag 91-41	500 lbs./hr. Dover sole 1,500 lbs./hr. sablefish	Drag 91-39	1,800 lbs./hr. Dover sole 3,000 lbs./hr. sablefish
			Drag 91-40	1,200 lbs./hr. Dover sole 2,000 lbs./hr. sablefish
Offshore	Drag 91-42	50 lbs./hr. Dover sole 100 lbs./hr. sablefish	Drag 91-43	200 lbs./hr. Dover sole 350 lbs./hr. sablefish
Strait of Juan de Fuca	Drag 91-45	900 lbs./hr. all fish mixed (not all salable)	Drag 91-44	2,800 lbs./hr. all fish mixed (not all salable)

Test fishing in Holmes Harbor and Saratoga Passage, Puget Sound, produced incomparable data. One Lampara tow produced 1,800 lbs. of hake and 100 lbs. of bottomfish, but the bottom body panel was ripped out of the net. Subsequent prospecting with the 400-mesh Eastern produced highly variable catches--with very small quantities of salable fish: 30 to 300 lbs. These test results indicate Lampara trawl is less satisfactory for bottom fishing than conventional 400-mesh Eastern trawl when used from 200 hp. boat (effective towing output of Cobb at 310 r.p.m.).

The trawl door spread with Lampara trawl was about $\frac{2}{3}$ the door spread obtained with 400-mesh Eastern with same length of towing cable out. The bottomfish catch rate of

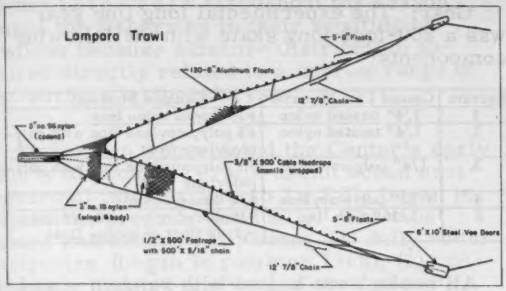

Lampara Trawl
5-8" Floats
130-8" Aluminum Floats
12' 7/8" Chain
3/8" x 900' Cable Headrope (manila wrapped)
5-8" Floats
6' x 10' Steel Vee Doors
1/2" x 900' Footrope with 600' x 5/16" chain
12' 7/8" Chain

Fig. 1 - Schematic drawing of Lampara trawl rigged for bottom fishing.

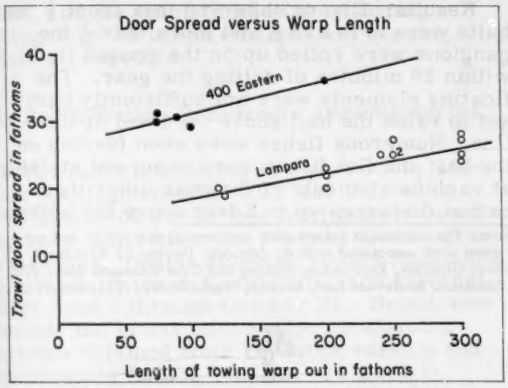


Fig. 2 - Relation of door spread and warp length for the Lampara trawl and 400-mesh Eastern. Both nets were towed at similar speeds over the bottom--Lampara at 310 r.p.m. and 400 Eastern at 240 r.p.m.

Lampara net was always lower in comparative tows than 400-mesh Eastern trawl.

Acoustic Spread Measuring System

Acoustic measuring equipment was operated during all tows in an effort to obtain information on trawl door spread.

Method and Materials: The measuring system consisted of the ship's echo sounder, 2 modified magnetostrictive transducers, and an oscilloscope. The transducers were installed in streamlined fiberglass-reinforced epoxy housings and mounted facing each other, one attached to tailchains of each trawl door. Electro-mechanical towing cable provided a circuit from transducers to boat. The transducers were connected in parallel through a transfer switch in wheelhouse to ship's sounder. An oscilloscope was connected across transducer leads to present a visual display of the signal.

Results: The gear spread measuring system produced useful information on trawl door spread. Unfortunately, the oscilloscope readout system apparently did not function because signal was too weak. The sounder's amplifier, though, increased signal so during most drags a reading was obtained on the recording paper.

Door Attitude Studies

The results of the door attitude studies were inconclusive because the adjustments resulted in only minor variations in spread. Initial attempts indicate that large changes in tailchain length are needed to produce measurable changes in door attitude.

Universal Trawl Evaluation

The Universal trawl, designed to fish on and off bottom, was the principal trawl used in the 1967 offshore hake fishery. Although the trawl was successful from the standpoint of production, its configuration had not been evaluated. Also, since the degree of ribline hang-in has been changed, it seemed desirable to have divers examine the trawl when fished in midwater. The divers measured the mouth opening with strings and depth gauges and photographed the net while towing.

Gear: The BCF Universal trawl body is 650 meshes wide at the mouth and 300 meshes long, with $2\frac{1}{2}$-inch #21 thread nylon top and sides, and $2\frac{1}{2}$-inch #36 thread nylon bottom and wings. The net has a 121-foot headrope with sixty-seven 8-inch trawl floats, and a 121-foot, $\frac{1}{2}$-inch manila-wrapped steel cable footrope with 26 feet of $\frac{5}{8}$-inch chain at each lower wingtip. The 6- by 10-foot V-doors were used to spread the net.

Results: The configuration of the Universal trawl was found satisfactory. The net opened 46 feet vertically and 33 feet horizontally. Although the footrope was hung in too much, and the after part of the body not hung in enough, the net's overall appearance was good.

Mark II Universal Trawl Evaluation

The standard Universal trawl is difficult to tow due to its large size and small-mesh construction. Therefore, a scaled-down, large-mesh version (Mark II Universal trawl), which might be more efficient at taking the faster swimming roundfish species, was designed and built.

Methods: The Mark II Universal trawl was examined by divers and test fished in a hake school. Net measurements with strings and depth gauges and photographs were taken by divers during a midwater tow in Puget Sound. Diver observations were also made during one bottom tow. Test fishing was conducted near the north end of Saratoga Passage, Puget Sound. Three tows were made with the doors on bottom because depth telemetry was not readily available.

Gear: The trawl is of the same design but smaller than the standard Universal net. The mouth is 260, 5-inch polyethylene meshes wide, and the headrope 94 feet long with 67, 8-inch floats attached. The footrope is $\frac{1}{2}$-inch polypropylene-wrapped steel cable with 20 feet of $\frac{5}{8}$-inch chain at each wing tip. The after body intermediate area is made of $3\frac{1}{2}$-inch mesh polyethylene web. All tows were made using the 6- by 10-foot V-doors.

Results: The trawl looked well underwater. It was much easier to tow than the standard Universal net and had a horizontal opening of 36 feet and a vertical opening of 32 feet. With the doors on bottom, the footrope was $3\frac{1}{2}$ feet off bottom.

The trawl was fished successfully on hake. The catch rates in all tows were good considering that the fish were well up in the water column. A catch rate of 12,000 lbs. per hour was obtained on one tow, although the echo sounder indicated most fish were well above bottom and probably not available to the net during the tow. Heavy gilling of small hake occurred in the $3\frac{1}{2}$-inch mesh rear body panels.

Evaluation of Buoyant Long Line Gear

Recent observations by commercial fishermen indicate that long line gear could be made more effective for sablefish if the gangions could be kept off bottom. An experimental skate of gear therefore was put together to test this hypothesis.

Methods: The experimental long line gear was set in shallow water in Puget Sound. A diver examination was carried out after setting, then the gear was left untouched for 3 days. A second diver examination was carried out just before recovery of the gear.

Gear: The experimental long line gear was a 200-foot-long skate with the following components:

Section	Ground Line Material	Gangion Material
1	1/4" treated nylon	#36 thread nylon line
2	1/4" treated nylon	#3 polypropylene line with polypropylene float
3	1/4" polypropylene	#3 polypropylene line with polypropylene float
4	9/32" polypropylene	#36 thread nylon
5	5/16" crab line	#36 thread nylon with polypropylene float or sponge float

All hooks were baited with random-sized chunks of fish.

Results: Divers observed that about $\frac{1}{3}$ the baits were missing and more than $\frac{1}{2}$ the gangions were rolled up on the ground line within 30 minutes of setting the gear. The floating elements were not sufficiently buoyant to raise the bait above the level of the line. Numerous fishes were seen feeding on the bait and flat fishes were observed striking at various elements of the gear other than bait at distances up to 2 feet above the bottom.

Note: For additional information concerning this cruise and program work associated with it, contact: Dayton L. Alverson, Base Director, Exploratory Fishing and Gear Research Base, 2725 Montlake Boulevard East, Seattle, Wash. 98102. Tel. 583-7729.

La Jolla's Information on Ocean and Albacore Aids Fishermen

For the past 7 years from April 1 to October 31, BCF's Fishery Oceanography Center at La Jolla, Calif., has made easier the jobs of west coast albacore fishermen by providing them with an increasing amount of information about the ocean and the albacore. It was in 1960 that BCF scientists routinely began publishing and mailing to fishermen monthly sea-surface temperature charts of the eastern Pacific Ocean. During the summer months, they issued 15-day sea-surface temperature charts for the ocean area just off the west coast where the albacore occur regularly each year. In 1961, the laboratory started pre-season predictions (issued in May) for the seasonal albacore tuna fishery. The annual forecast indicated the region where the bulk of albacore should be present in July, attempted to foretell when the fishery would begin and estimated the relative abundance of alabcore at the beginning of the season. Up-to-date temperature charts issued at

15-day intervals throughout the season helped the fishermen in their scouting operations because albacore distribution appeared directly related to a narrow range of sea-surface temperatures.

Fishermen appreciated the Center's early efforts to provide certain useful ocean environmental information, so La Jolla began to expand the program gradually. The most recent innovations have been: (1) daily radio advisories (begun in summer 1966), (2) continuously updated analyses of the fishery's seasonal progress (included with sea-surface temperature charts in the monthly publication), and (3) special bulletins reporting changes in the ocean environment--taking place or expected.

Its Radio Station Broadcasts Documentaries

The radio advisories are sent out by station WWD, licensed to BCF and located on the campus of the Scripps Institution of Oceanography, adjacent to the Fishery-Oceanography Center. Double sideband voice broadcasts are made twice daily (morning and evening) from June 1 through October 31. Broadcasts include the latest information on albacore catches obtained from research vessels and cooperating fishing vessels, sea-surface temperatures observed at selected points, and weather information. At the end of each 15-day calendar period, the BCF staff also codes and transmits (twice daily for two consecutive days) key isotherms from the 15-day sea-surface isotherm charts routinely mailed to fishermen. The coded message provides fishermen at sea with current information on the location of the 60°-66° F. temperature zone--from which more than two-thirds of the total Pacific coast albacore catches are produced. In the future, a prognostic 15-day sea-surface temperature field also will be included. These advisories are a fast way of reporting significant changes that sometimes occur suddenly in the ocean and atmosphere, affecting albacore distribution and fleet operation.

The radio broadcasts have helped the Center's efforts to provide information on a timely basis. Unfortunately, many fishing vessels do not have radio equipment adequate to receive the broadcasts consistently. These vessels must depend on relay from other vessels with good radio gear. And, in the relay process, much detail and timeliness are lost.

Computer Helps Lab

In summer 1967, full-scale operation began at La Jolla of the U. S. Naval Weather Service Environmental Data Network link. Its master computer facility at Monterey will augment the Center's understanding of oceanographic and climatological events. The Center now receives computer-analyzed products updated at 3-, 12-, and 24-hour intervals. This permits the scientific staff to monitor environmental changes in the north Pacific almost as they occur. One immediate result of this service has been the development of a capability to anticipate environmental events on a scale heretofore impossible. As the staff's experience in using and interpreting the FNWF Monterey products increased, it has successfully remained "on top" of situations that developed rapidly. Now continuous, quickly published reviews of seasonal events are possible; so too timely bulletins when needed.

Problems Remain

The Center's staff believes that expansion and refinement of the ocean information service can advance only as fast as resources and experience permit. There is need to increase understanding of the effect of ocean changes on the distribution of albacore. There still is the problem of obtaining appropriate information on the ocean environment and the fishery on a synoptic (current) basis. And there must be improvement in the means of getting to fishermen information immediately applicable to their operations.

The experience being gained with the west coast albacore fishery is expected to be useful to other fisheries. It may well establish in the future a nationwide pattern.

'Market News' Begins 31st Year of Serving Fishing Industry

BCF's Market News Service is beginning its 31st year of providing timely and important information about fish, fishery products and the many-faceted industry to 10,000 subscribers in the U. S. and around the world.

Its network of 7 field offices is located strategically to report the activities in principal fish-landings ports and wholesale centers. Their staffs process a welter of information to provide authentic data that put buyer and seller on an equal footing--and expedite transactions. The Service's reporting ranges from prices paid at the vessel, in wholesale centers for fish and processed fishery products, to research findings about fish populations and developments in fishing gear, fish processing and packaging techniques.

The mimeographed reports of the Service--"Fishery Products Reports," a different color for each office--are issued daily from field offices in Boston, New York, Hampton, Va., New Orleans, Chicago, Seattle, and San Pedro, Calif. A subsidiary station in Baltimore covers the local industry and relays information to its parent office at Hampton.

Market information also is passed to the public by telephone, collect telegrams, or teletype, personal contact, and through the press and radio broadcasts.

'Service' Adapted to Industry Changes

When the Service began in 1937, most fishery market activity was centered on fish landings, wholesale market receipts, and the marketing of wet (iced) fish. In its 30 years, the Service adapted itself frequently to reflect the changes and developments in the harvesting, processing, and distribution of fishery products in the U. S.

Today, Market News Service also reports on a wide variety of processed and ready-to-serve products--fish sticks and portions, other portion-control items, all processed shrimp, and specialty seafood items. And it provides information on fishery products--fish meal, oil and solubles--and future trading in fish meal on New York and London commodity exchanges.

Seattle Lab to Study an Aleutian Area

BCF's Biological Laboratory in Seattle, Wash., has contracted with the Atomic Energy Commission to study the ocean environment and marine ecology near Amchitka Island in the western Aleutian chain. The project is part of a general study to understand the undisturbed aquatic environment before underground nuclear testing is begun.

The January-February 1968 study will focus on the distribution and abundance of plankton and fishes near Amchitka Island--and on the distribution and magnitude of the ocean currents.

10 U. S. Firms Taking Part in London and Milan Fairs

Ten U. S. firms are showing 23 fishery products in food fairs being held at London, Jan. 9-18, and Milan, Italy, Jan. 20-27. Both fairs are aimed at the institutional and catering trade.

The participation of U. S. firms in international food fairs is organized by BCF's Office of International Trade Promotion (OITP). The London Fair is OITP's fifth promotion in the United Kingdom and the first since the pound was devalued. The fair may indicate what effect devaluation will have on British imports of U. S. fishery products.

Excellent Results Obtained

U. S. participation in previous fairs led to new markets for Maine shrimp and frozen lobsters. Also, sales were greatly expanded for salmon, Gulf of Mexico shrimp, and Alaska king crab meat.

ARTICLES

CLAM SURVEY OFF VIRGINIA

(Cape Charles to False Cape)

By Phillip S. Parker* and Lars A. Fahlen**

The third in a continuing series of surf clam (Spisula solidissima) surveys being made by the Bureau of Commercial Fisheries was completed off the coast of Virginia between May 1965 and May 1966. Its purpose was to explore for populations of surf clam; to determine its abundance and distribution and factors affecting its populations; and to collect data on other species of shellfish. Samples were taken at selected survey sites with a 48-inch hydraulic dredge. During the survey, 1,367 stations were occupied, and catches ranged from 0 to 9 bushels of surf clams per tow. Catch rates of 1 bushel per 4 minutes of towing time were obtained at 54 stations. Abundance, distribution, and size of clams varied considerably. Relations were noted between these variations and environmental data collected. Small populations of ocean quahogs (Arctica islandica) were widely scattered.

The surveys were made by BCF in conjunction with the Sea Clam Packers Association of the Oyster Institute of North America. They have become an integral part of the overall BCF study to determine facts relating to the life history and abundance of the surf clam.

During the past few years, the surf clam (Spisula solidissima) has exceeded both the hard clam (Mercenaria mercenaria) and soft shell clam (Mya arenaria) in production (table 1). Total surf clam production in 1965 was a record 44 million pounds of shucked meats (Groutage and Barker, 1967). Over 60 vessels are now engaged in the fishery. The center of the fishery still remains off the coast of New Jersey; 96 percent (42.3 million pounds of meats) of the total landings was made in New Jersey (Groutage and Barker, 1967).

Table 1 - Annual Production of Clam Meats for Three Species of Shellfish, 1961-65

Year	Surf Clams	Soft Shell Clams	Hard Clams
1961 1/	27,502,000	7,363,000	14,604,000
1962 1/	30,854,000	9,396,000	13,295,000
1963 1/	38,586,000	9,754,000	14,529,000
1964 1/	38,144,000	11,030,000	14,925,000
1965 2/	44,088,000	11,310,000	14,470,000

1/Source: Fishery Statistics of the U. S., 1961-64.
2/Source: Office of Statistical Services, BCF, Gloucester, Mass.

The surveys are designed to locate and define within each survey area beds of surf clams, to determine the size and extent of these beds, and to evaluate their potential for future commercial harvesting.

AREA OF OPERATION

The survey was completed in Area II, which lies off the coast of Virginia from about midpoint of the eastern shore peninsula down to False Cape, Va. (fig. 1). Its western boundary extends 54 miles northeastward to a point on the southern boundary of Area III at latitude 37°22' N. and longitude 75°16' W. From this point, its northern boundary follows the south boundary of Area III seaward and extends beyond the southeast corner of Area

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Note: An appendix to this article is available in reprint (Sep. No. 804). For a free copy of the Separate, write to Office of Information, U. S. Department of the Interior, Fish and Wildlife Service, BCF, 1801 N. Moore St., Arlington, Va. 22209.

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
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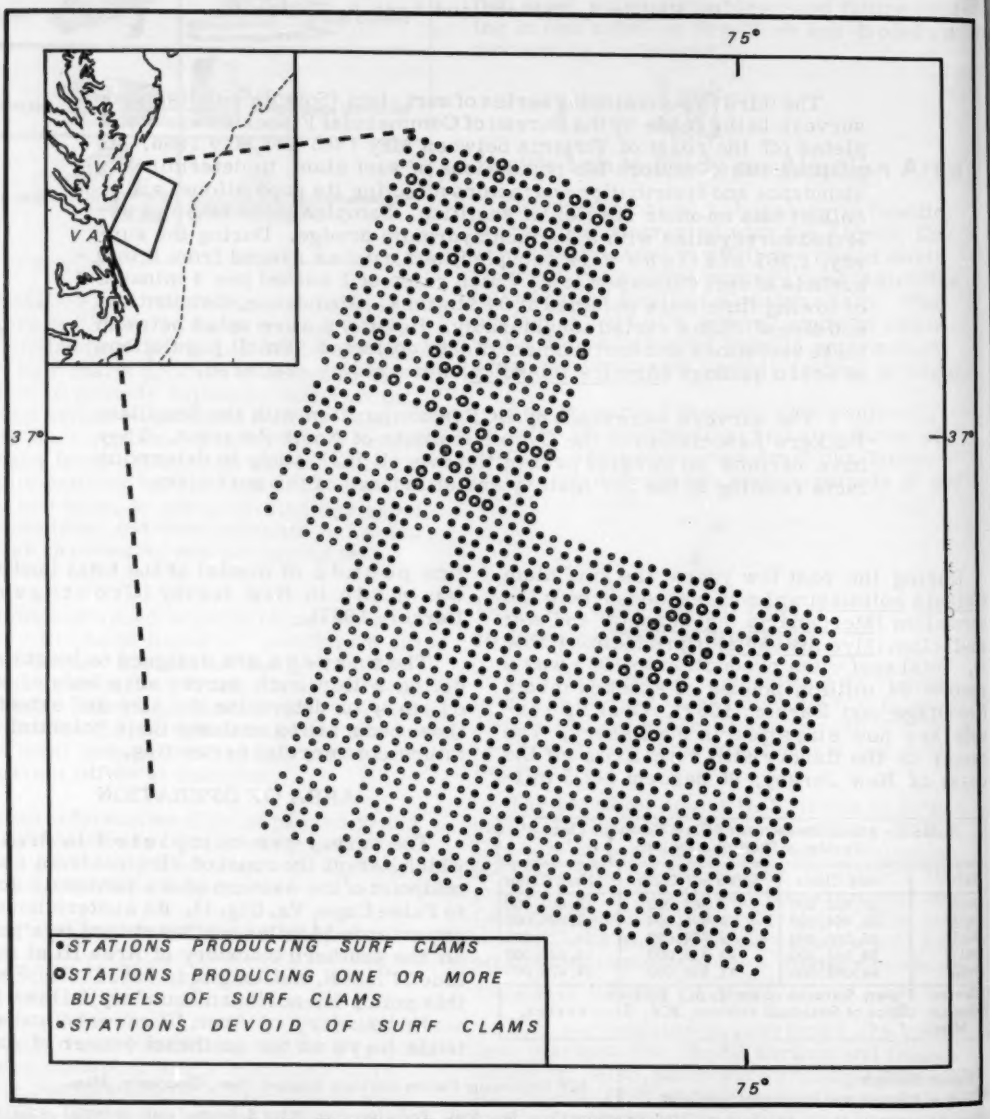

Fig. 1 - Chart of Area II showing location of individual survey stations.

III, until it reaches the 100-fathom contour at latitude 37°05' N. and longitude 74°35' W. From here, its eastern boundary runs southwestward to latitude 36°16' N. and longitude 75°02' W. Its southern boundary is formed by a line connecting this point with False Cape, Va. The area within these boundaries is 2,200 square miles. However, because of the presence of unexploded depth charges and other missiles, most of the northeast quadrant was bypassed, along with the inshore section of the southeast quadrant. About 1,400 square miles were left to survey.

GEAR AND EQUIPMENT

The survey of Area II was made from the Bureau's research vessel "Delaware," employing the same gear and equipment used in Area III and described by Parker (1967). We experimented to some extent with various manifold jet sizes on the 48-inch experimental dredge, but the resulting changes in water volume and pressure were so small that we were unable to detect any difference in the fishing efficiency of the dredge.

During one cruise, underwater television was used to observe the operation of the dredge fishing on the bottom. We were able to see that the blade of the dredge did not dig into the bottom until the water system was activated to cause the jets of water to dig a trench in front of the manifold. When the water system was shut off, the blade would rise immediately to the surface of the sea bottom. We also saw very little turbidity resulting from the hydraulic action of the manifold jets, and the turbulence caused by these jets was negligible. We failed to see live surf clams on the bottom, but saw many other forms of animal life during the period of television observation.

Attempts to take bottom temperatures with an electronic probe attached to the dredge proved unsuccessful because the transmission cable repeatedly parted between the dredge and the readout meter in the pilothouse.

Samples of material too small to be retained by the main dredge were collected in a small mesh retaining unit in the after cage of the dredge. Samples from this unit were placed in small plastic bags and frozen for later analysis shoreside.

PROCEDURE

The same general procedure was followed in the survey of Area II as was used during the 1963 survey in Areas IV and VI (Parker, 1966) and the 1964 and 1965 surveys in Area III (Parker, 1967). Each survey station was located at the intersection of predetermined grid lines running generally north to south and west to east (fig. 1). The main or north-south grid lines parallel the 1H5 Loran line in the area, whereas the secondary or station grid lines follow the 1H4 Loran line. We simplified the location of each sampling station and increased the ease of vessel navigation by employing this station system. Owing to the divergence or convergence of these grid lines in any single operational area, some discrepancies will occur in the distances between sampling stations. The discrepancies, however, are not of a magnitude that would cause concern over the reliability of the data. Each north-south grid line was positioned at a distance of 4 microseconds throughout Area II, whereas the east-west grid line interval was established at 12 microseconds.

The standard sampling tow was 4 minutes; however, because of bottom conditions in some sections, the tows were shortened. Several 20-minute simulated commercial tows were also made. Most tows were made at a propeller speed of 100 revolutions per minute, which we assumed gave a towing speed of about 1 knot. The propeller never dropped below 100 r.p.m., but, at times when strong head tides slowed the vessel, the revolutions per minute were increased to compensate for the tides.

At the completion of each tow, the dredge was hauled back aboard the vessel and dumped. The dredge was then returned to the bottom and towed to the next station, at which time the water system was activated and a sample taken.

Between stations or tows, clams and other collected material were measured. Materials were selected from the samples and saved for later analysis. Information on water temperatures, bottom sediments, and catch composition was also taken at this time.

RESULTS

In Area II, 1,421 sampling sites were occupied. Of these, 1,367 were tows of 2- or

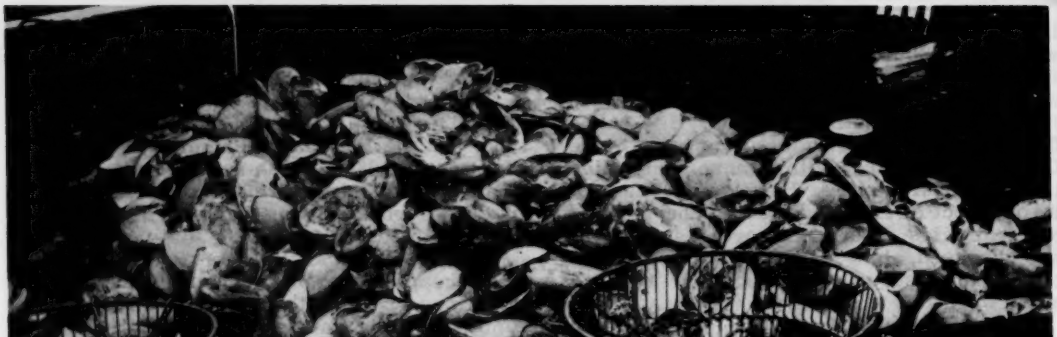

Fig 2 - Typical catch by a hydraulic jet dredge from most of the unexplored areas along the Middle and North Atlantic coast. Note the vast number of shells mixed in with the few live clams.

4-minute duration and the remaining 54 were simulated commercial tows of 20-minute duration.

Catches

Of the 1,367 tows (fig. 2), 717 took no surf clams, 596 caught from 1 surf clam to slightly less than 1 bushel, and 54 took 1 bushel or more (1.0 to 8.8 bushels).

To clarify better the results of the survey in Area II, we have subdivided the area into four sections (fig. 3) as follows: Section A--the northwest part of the area; Section B--the northeast section, which was bypassed in the survey because of the presence of unexploded depth charges; Section C--the southwest section; and Section D--the southeast part of the area.

Section A.--The most extensive populations of surf clams were in this section. The maximum catch rate of 2.2 bushels per minute of towing time, and 70 percent (38 tows) of the tows that caught 1 bushel or more per tow, occurred in Section A. The percentage of tows catching no clams was least from this section. Because of time restriction and bad weather, simulated commercial tows were not made. But, based on results in previous areas surveyed, we expect that catches in excess of 5 bushels per 20 minutes could have been taken in this section.

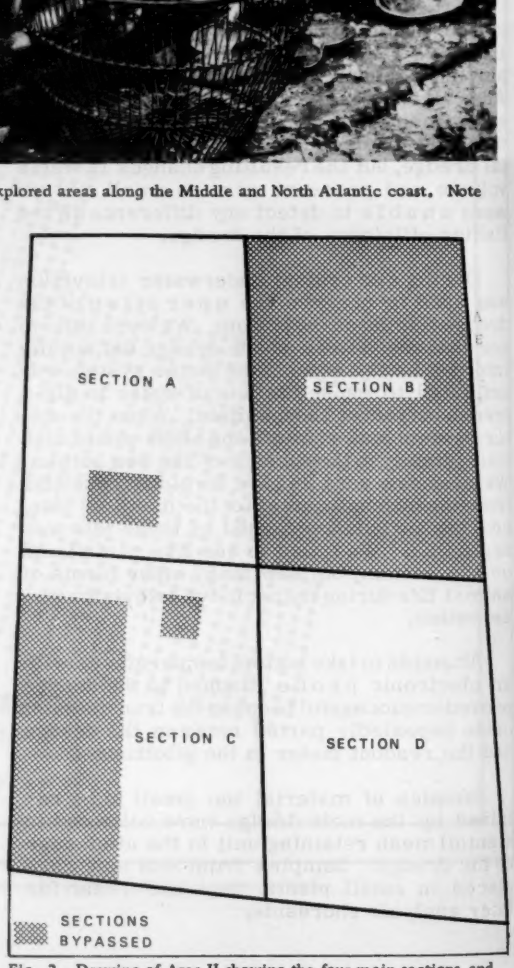

Fig. 3 - Drawing of Area II showing the four main sections and bypassed sections.

The average size of surf clams in this section was less than that in Section D, but considerably larger than that from Section C.

Section B.--Although no attempt was made to sample this section, we assume that surf clams exist there. Populations of surf clams were found north, west, and south of Section B.

Section C.--Surf clams were found in good quantities; however, the population structure in this section was different from the other surveyed sections. Here the number of clams in the commercial-size range (5 inches and above) was only 7.0 percent, compared to 81.0 percent in Section D and 65.0 percent in Section A. The percentage of surf clams in the medium-size range (3 to 5 inches) from Section C exceeded the percentage from the other two sections: Section C - 84.0, Section A - 32.0, and Section D - 18.0 percent.

Section D.--Dense surf clam populations were concentrated in about the middle of this section. However, the number and density of beds producing catches of 1 bushel or more per tow were less here than in Section A. The average size for clams taken over 4 inches (100 mm.) was much greater here than in either of the other two sections: Section D - 6 inches (153 mm.), Section A - 5.6 inches 143 mm.), and Section C - 4.6 inches (116 mm.). Between the eastern boundary of Section C and the dense beds of clams in this section, few surf clams were found. Beyond the outer edge of the dense beds, surf clams were again found in small numbers; however, they were still being taken in the tows made along the last grid line, which would indicate that they may be living beyond Area II.

Results obtained in this section from the 54 simulated commercial tows were poor. All catches took less than 5 bushels. These catches imply that the present population of

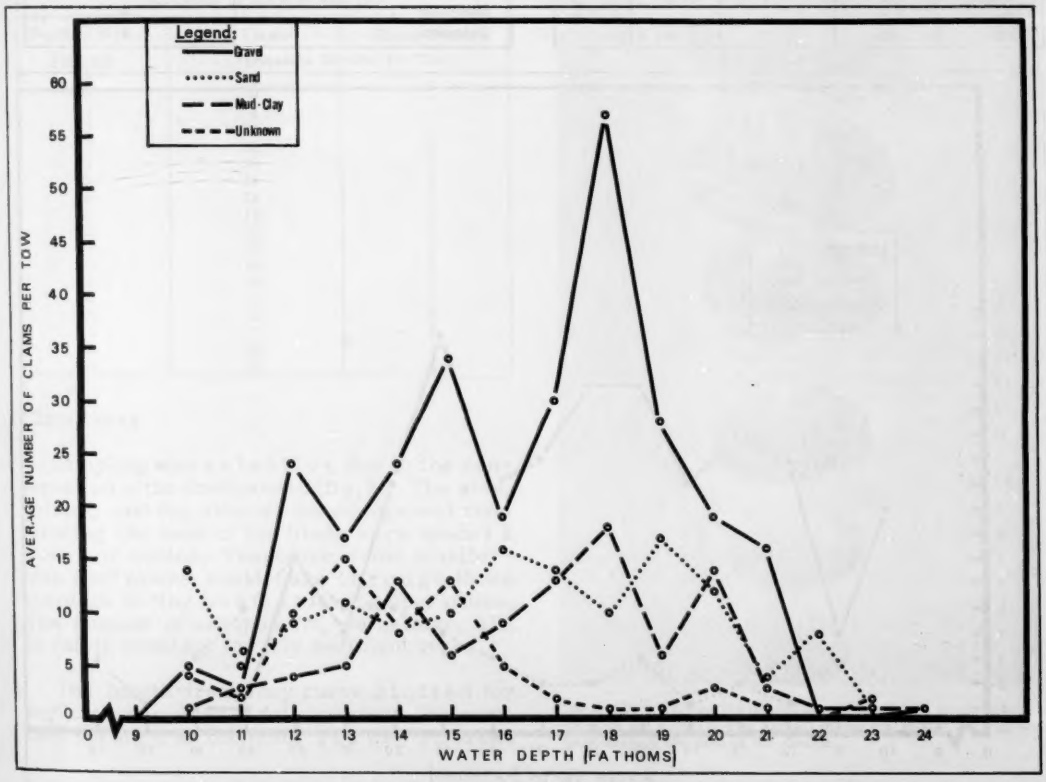

Fig. 4 - Relation of catch rate to water depth and different bottom sediments in Area II.

surf clams in this section would not sustain a commercial fishery.

Bottom Sediments

Area II data were compared to see if any relation could be found between the bottom sediments and the population of surf clams. A relation was found between the mean number of clams caught and the bottom type fished (fig. 4, table 2). The bottom in Area II was divided into four general classifications: (1) sand, (2) gravel, (3) mud, clay or a mixture of both, and (4) unknown. The types of bottom arranged with the most productive listed first are: (1) gravel, (2) sand, (3) mud-clay, and (4) unknown. The mean catch from stations with gravel bottom was 2 times that from sand, 3 times that from mud and clay, and about 6 times that from unknown sediments (table 3).

Table 2 - Catch Rate of Surf Clams by 1-Fathom Intervals for Different Sediments in Area II

Water Depth	Bottom Soil Types			
	Unknown	Mud-Clay	Sand	Gravel
Fathoms	. . . (Average Number of Clams Per Tow) . . .			
9	-	-	0	0
10	4	1	14	5
11	2	3	5	3
12	10	4	9	24
13	15	5	11	17
14	8	13	8	24
15	13	6	10	34
16	5	9	16	19
17	2	13	14	30
18	1	18	10	57
19	1	6	17	28
20	3	14	12	19
21	1	3	4	16
22	0	1	8	0
23	2	1	1	0
24	0	1	0	1

Table 3 - Mean Catch of Surf Clams Taken from Different Bottom Sediments in Area II

Bottom Sediment	Mean Catch of Clams
	Number
Gravel	25
Sand	11
Mud-clay	8
Unknown	4

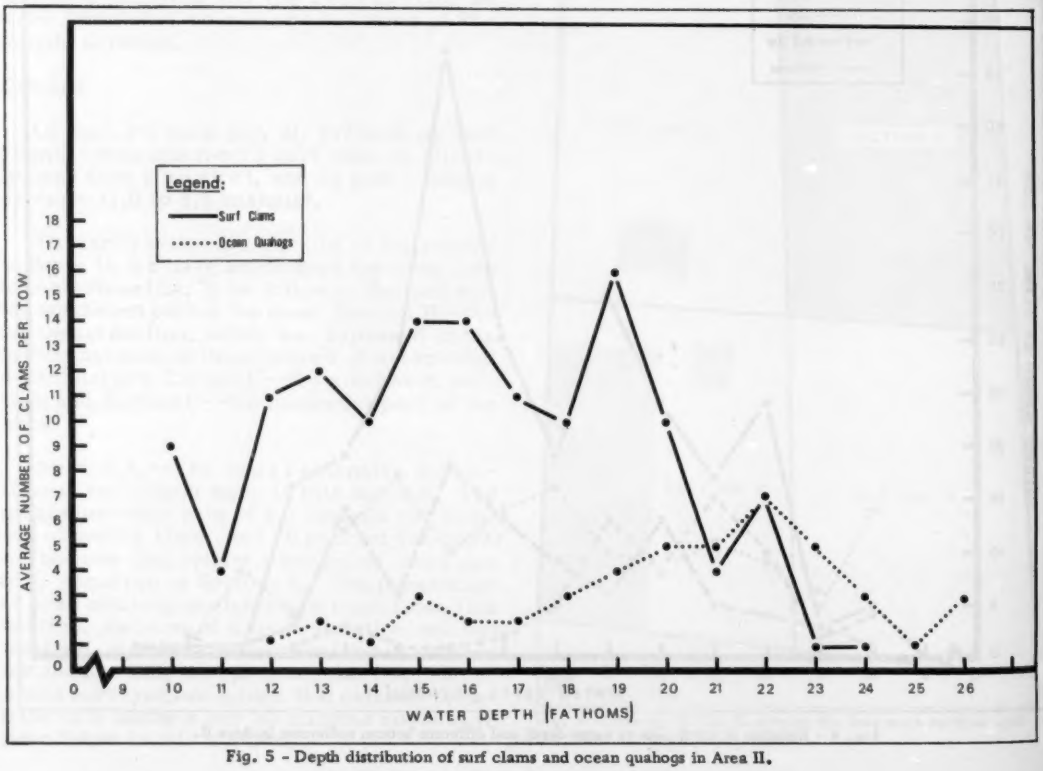

Fig. 5 - Depth distribution of surf clams and ocean quahogs in Area II.

Water Depths

Water depth and clam density data from Area II were compared to determine if any relation existed between the catch rate and the depth of water (as was found in Areas III and IV). In general, the pattern of catch rate and depth held true here as in the other two areas. The best catches of surf clams were made in those sections where the depth of water varied between 14 and 20 fathoms (fig. 5, table 4). Although the average catch in Area II was less for all depth intervals in comparison to Area III, the largest average catches were made at 19 fathoms in both areas. No surf clam was taken in either area at depths beyond 24 fathoms. The number of sites occupied in Area II in depths beyond 24 fathoms was considerably less than in Area III. The number of shallow water stations occupied in Area III exceeded those sampled in Area II.

Table 4 - Depth Distribution of Surf Clams and Ocean Quahogs in Area II

Depth of Water	Surf Clams	Ocean Quahogs
Fathoms	. . . (Average Number Per Tow) . . .	
9	0	-
10	9	-
11	4	-
12	11	1
13	12	2
14	10	1
15	14	3
16	14	2
17	11	2
18	10	3
19	16	4
20	10	5
21	4	5
22	7	7
23	1	5
24	1	3
25	0	1
26	0	3

Clam Sizes

Sampling was selective due to the construction of the dredge used (fig. 6). The side, bottom, and top slots of the dredge and rods forming the base of the blade were spaced 2 inches on center. Therefore, some smaller-size surf clams could pass through these openings during normal towing operations. The amount of escapement, we believe, will be fairly constant for any sediment type.

The length-frequency curve plotted for surf clams in Area II follows about the same configuration as for other surveyed areas

Fig. 6 - Size distribution of surf clams taken in a single tow. Most of the medium-size and all of the small-size clams could pass through the slots of the dredge.

(fig. 7, table 5). The peak occurs within the commercial-size range.

The dominant size differed for the three sections of Area II. Clams in the 5.5- to 6.3-inch (140 to 159 mm.) length groups constituted most of the catch from Section A (table 6). In Section C, medium-size clams prevail and very few clams were of commercial size. The percentage of clams in the 5.9- to 6.7-inch (150 to 169 mm.) size groups was greatest

Table 5 - Number of Surf Clams Taken in Area II in Each 10-Millimeter Length Group

Length Interval		Surf Clams
Millimeters	Inches	Number
20-29	0 8-1.1	5
30-39	1.2-1.5	10
40-49	1.6-1.9	33
50-59	2.0-2.3	83
60-69	2.4-2.7	207
70-79	2.8-3.1	277
80-89	3.1-3.5	452
90-99	3.5-3.9	777
100-109	3.9-4.3	971
110-119	4.3-4.7	593
120-129	4.7-5.1	503
130-139	5.1-5.5	908
140-149	5.5-5.9	1,895
150-159	5.9-6.3	2,521
160-169	6.3-6.7	1,641
170-179	6.7-7.0	387
180-189	7.1-7.4	37
190-199	7.5-7.8	1

Table 6 - Percentage of Surf Clams in Each 10-Millimeter Length Group for the Three Sections of Area II

Length Interval		Section A	Section C	Section D
Millimeters	Inches	(Percent)		
20-29	0.8-1.1	1/0	-	1/0
30-39	1.2-1.5	1/0	1/0	1/0
40-49	1.6-1.9	1	1/0	1/0
50-59	2.0-2.3	1	2	1
60-69	2.4-2.7	1	5	1
70-79	2.8-3.1	2	7	1
80-89	3.1-3.5	2	12	1
90-99	3.5-3.9	3	24	2
100-109	3.9-4.3	4	23	2
110-119	4.3-4.7	4	10	3
120-129	4.7-5.1	5	5	3
130-139	5.1-5.5	12	2	6
140-149	5.5-5.9	26	2	13
150-159	5.9-6.3	25	3	30
160-169	6.3-6.7	12	2	29
170-179	6.7-7.0	2	3	8
180-189	7.1-7.4	1/0	1/0	1/0
190-199	7.5-7.8	-	1/0	-

1/Less than 0.5.

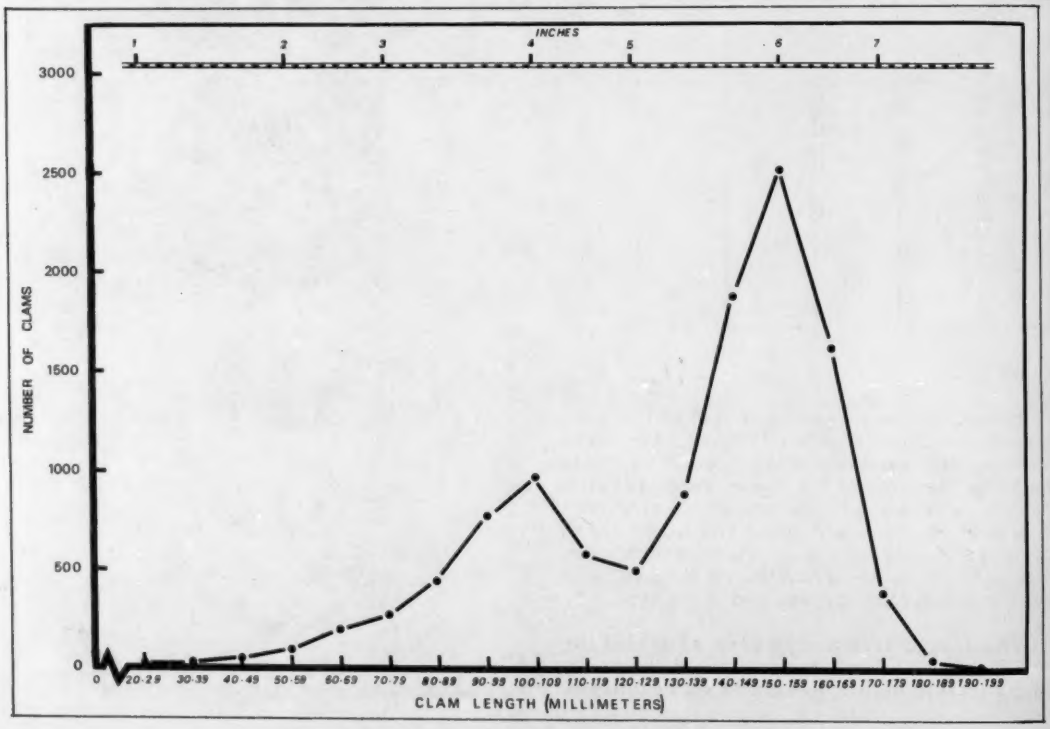

Fig. 7 - Length-frequency distribution of surf clams from Area II.

in Section D. At the same time, the relative number in the medium- and small-size groups was smallest in Section D.

Population

In Area II, the best beds of surf clams were in Sections A and D. These two sections are widely separated--A is just south of Area III, and D offshore and southeast of Section A. Because Section A is just south of Area III, the surf clam beds here are probably a southern extension of the beds in Area III, having their southern limits established by the inflow of water from Chesapeake Bay and shallower waters to the south. Their western or inshore expansion is also limited by shallow waters overlaying unproductive bottom sediments. Seaward, their range is controlled by the depth of water.

Although these beds of surf clams are in the commercial producing range, they do not equal the density of those just to the north in Area III. The structure of these surf clam beds, however, resembles closely those in Area III. Their densities in relation to bottom sediment and depth follow the same pattern as observed for Area III. Relations between the number of commercial-size clams and smaller clams seem to be the same here as in other areas surveyed. These environmental factors, therefore, appear to control the surf clam densities and possible bed expansion in Section A.

In Section C, the number of medium-size surf clams in the population may have been the result of some phenomenon that caused the spawn or larval of the surf clam to concentrate in vast numbers. Most of the clams caught here measured between 2.8 and 5.1 inches (70 and 130 mm.) long. Whether these vast numbers of medium-size clams will reach commercial size is another question.

The big difference between the surf clam population structure in Sections A and D was in their maximum size. In Section D, the mean maximum size was greater than in the other two sections. In all other respects, the length frequency curve and population structure was about the same as in Section A.

The best or largest beds of surf clams in Section D were located in its north-central part, and very few surf clams were taken offshore of this segment. Inshore of this segment, vast numbers of surf clam shells were taken in each tow, and often the bag and cage were filled with shells.

In Section D, the size of the surf clam beds may be limited somewhat by the fact that this section may be located at, or near, the optimum southern range limit of the surf clam. If this is true, the chances of an increase in the bed sizes or densities in Section D are remote. Therefore, the development of a commercial fishery in this section is unlikely--unless the price per bushel paid to the fisherman is increased sufficiently to compensate for the expected reduced daily catch.

In all sections of Area II, the possibility of establishing a commercial fishery will depend upon whether or not the price of clams will increase enough to compensate for the lower catch rates. Overall, the surf clam beds in Area II cover an area of considerable size, but within this area the surf clam densities are less than in Areas III and IV.

Ocean Quahogs

Ocean quahogs (Arctica islandica) were scattered in isolated locations throughout the area. Concentrations of this species never equaled those found in Areas III, IV, and VI.[1/] Generally only one or two ocean quahogs were taken with surf clams at any one survey site. Few ocean quahog shells were noted in the catches, which indicates that the ocean quahog population was small throughout Area II. In all probability, Area II is near or at the southern limit of the range of this species. We do not assume that the population structure of the ocean quahog will be the same in the deeper offshore waters as that found in Area II.

DISCUSSION

The main differences between Area II and Area III (Parker, 1967) were in the size and density of surf clam populations. The density of surf clams in Area II was about one-half that observed in Area III. Other differences were the hydrographic and ecological variations between areas. These variations may have caused the difference in density of surf clam populations.

We assumed that one of the causes for the natural environmental conditions existing in Area II might be the flow of water from Chesapeake Bay. Its greatest effect would be felt in Section C of Area II lying directly in the

1/Originally designated as survey Areas V, IV, and I.

mouth of the Bay, decreasing as the distance offshore from the mouth of the Bay increased. If the currents were strong enough to carry the richer Bay waters offshore to Section D, where the largest-size clams were caught, this might explain at least part of the cause of this growth. To the north, in that part of Section A uninfluenced by the inflow of Chesapeake Bay waters, the surf clam population was very similar to that in Area III.

In any comparison between areas, one should keep in mind the probability that many unmeasurable environmental facts may be present in all large areas. Any one of these factors may have a tremendous effect on the total biological and physical characteristics within an area; any one factor could influence the surf clam population to a degree that would be unexplainable from the data obtained during our standard surveys. These factors may have a greater influence on surf clam populations than is realized. Therefore, before logical long-range management plans can be made most, if not all, of these factors will have to be understood and considered.

Why do we find in some areas with about the same depths and bottom sediment types dense populations of surf clams in one section and only a few or none in another? Will a small population become better populated in the next generation, or will it take many generations? Will poor producing sections ever produce sufficient clams for commercial harvesting? If they do, what will be the long-term effect of cropping on the surf clam populations?

The growth pattern of surf clams in Area II is about the same as in Area III. The young clam goes through a period of very rapid growth, after which the annual growth increment declines steadily until death. Surf clams may reach a maximum length of 8 inches or more.

SUMMARY

The third BCF surf clam survey was conducted in Area II off the coast of Virginia, between Cape Charles and False Cape, during 1965 and spring of 1966.

Out of 1,367 tows made, 717 took no surf clams, 596 caught from 1 surf clam to slightly less than 1 bushel, and 54 took 1 bushel or more.

Fifty-four simulated commercial tows made in the area produced very poor results. No tow caught 5 bushels of clams in 20 minutes.

The same relation between bottom sediments and surf clam densities was observed in Area II as in Areas III, IV, and VI. Also observed was a close relation between the size of catch and water depth; optimum catches occurred between 14 and 20 fathoms.

Owing to the dredge design, only a few clams less than 2.0 inches (50 mm.) were collected. As in all previous surveys, the dominant clam length was between 5.5 and 6.7 inches (140 mm. and 170 mm.).

Throughout the area, considerable variations were observed in the size, abundance, and distribution of surf clams. Extensive segments were almost void of the surf clam, while others had good populations.

Still smaller populations of ocean quahogs were observed in this area than in Areas III, IV, and VI.

LITERATURE CITED

GROUTAGE, THOMAS M., and ALLAN M. BARKER
1967. The Surf Clam Fishery, Commercial Fisheries Review, vol. 29, no. 2 (February), pp. 55-58. (Also Sep. No. 780.)

PARKER, PHILLIP S.
1966. Ocean Clam Survey off U. S. Middle Atlantic Coast--1963. Commercial Fisheries Review, vol. 28, no. 3 (March), pp. 1-9. (Also Sep. No. 756.)

1967. Clam Survey Ocean City, Maryland, to Cape Charles, Virginia. Commercial Fisheries Review, vol. 29, no. 5 (May), pp. 56-64. (Also Sep. No. 791.)

FAO STUDY TOUR IN USSR

By Dr. Dayton L. Alverson*

[For several years, FAO has sponsored study tours in the Soviet Union for developing nations. While the topics of these tours change from year to year, they deal generally with technical fisheries matters. The subject of the 1967 study tour, Sept. 21-Oct. 18, was "Fish Behavior as Related to Fishing Techniques and Tactics." It was selected to augment the FAO conference of the same title in Bergen, Norway, Oct. 19-28. Dr. Alverson was a lecturer on the Soviet study tour and chairman of the FAO conference. Below are some impressions of his trip.--Ed.]

There is a high degree of integration in Soviet fisheries science. This is evident from the studies of the All-Union Research Institute of Marine Fisheries (VNIRO), the field laboratories, and the Soviet Academy of Science. A statement at the opening ceremony of our tour suggested that Soviet fisheries research was strongly motivated by the desire to understand behavior--in order to harvest fish and to improve survival of fish populations and the productive capacity of the oceans.

Some of our meetings were held in the Georgian Scientific Research Institute in Batumi, which is on the southeast coast of the Black Sea, near Turkey. The institute is under the line authority of VNIRO.

They Seek Important Answers

Many lecturers were from the Soviet Academy of Science. I was impressed with the fact that Academy scientists were conducting research and evaluating its results from the standpoint of their application to improving Soviet fisheries. There seemed to be no stigma attached to their involvement in applied research. These scientists were studying sensory physiology with particular emphasis on understanding the sensory modalities involved in detecting various stimuli within the fishes' environment.

They are asking and seeking answers to the following types of questions: By what means do fish detect sound? How is the sound transmitted internally? What are its sensory capabilities regarding sound intensity and frequencies? How can or does a fish orient to sound? Does a fish have orientation capabilities in the near field and, if so, how is this achieved? Similar questions were being asked about vision.

The results of these studies seem to flow to the behaviorists who were, more often than not, involved in VNIRO or other field projects. These researchers attempted to utilize the information on sensory physiology and general behavior to determine in what means knowledge of behavior could be used to improve harvest capabilities.

ACOUSTICAL HERDING

Perhaps the most exciting and certainly one of the most interesting lectures presented was by Prof. A. Shein of VNIRO. Actually, the work is being done at PINRO (Polar Research Institute of Marine Fisheries and Oceanography). Shein discussed three areas of interest to the future of high seas fisheries. They involved acoustical herding, acoustical counting, and near-bottom detection methods. The information on acoustical herding was by far the most interesting and revealing development that I have seen in the Soviet Union in the past several years. Apparently, the Soviets have been investigating biological sounds produced by fish and mammals, and the individual and group reaction of fishes to various biological and nonbiological sounds.

In investigating the behavior of cods and herring in the North Atlantic, the Soviets determined that they could drive midwater schools of cod and herring down to within 2-3 meters of the seabed by using low-frequency

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sound. The original experiments involved (1) detecting schools of herring or cod; (2) transmitting a signal of about 1,000 cycles for a period of about 15 seconds; the signal strength at one meter from the microphone was 2,000 bars and the signal nondirectional. This brought about an immediate response on fish schools observed on the echo sounder. The fish moved rapidly toward the seabed but soon began to ascend in the water column. The signal would then be reproduced and a similar reaction would occur. However, the amplitude of vertical movement decreased with each successive reproduction of the 1,000-cycle sound. The fish apparently acclimate to this nonbiological sound rather quickly. Subsequent changes in the power or character of the sound, that is, simple or compound combinations, would no longer bring about the desired response.

Biological Sounds

The second phase in the investigation dealt with application of biological sounds, or as the Soviets put it, "sound which had biological meaning to the fishes involved." Recordings were made of various mammals and fishes which preyed on cod or herring, and a variety of predator sounds were thus catalogued. In subsequent experiments with herring and cod, low-frequency biological sounds were used to drive fish toward the seabed. In a serial presentation of a number of echograms, there was a rather dramatic response to these biological sounds. Schools of fish as much as 50 meters above the seabed (cod and herring) moved rapidly down toward the ocean floor and remained there during periods the biological sounds were being broadcast. For herring, the effect was more dramatic and appeared to represent almost a total change in school distribution. The sounds used for herring represented a species of tooth whale. Dr. John H. S. Blaxter, University of Aberdeen, Scotland, Prof. Toshero Kuroki, Hokkaido University, Japan, and I did not doubt that the echo tracings, as shown, implied a dramatic breakthrough in acoustical herding and one which could have a real impact on the utilization of ocean resources. The idea here is not to eliminate the behavior that leads to escape, but to increase the density of fish within the influence of a harvesting device. This coupled with Soviet experiments now underway to eliminate, via electronarcosis, behavior that leads to escape from the harvesting devices, could bring about a major increase in efficiency.

The Soviets stated that they had increased catches utilizing the acoustical herding method from 300 to 500%. We did not, however, see any actual comparative tow data. All the lecturers, however, were convinced that the echograms were legitimate. The validity of the Soviet claims was later verified by the fact that Scottish investigators working out of Aberdeen have had similar results in their studies.

Echo Counting and Bio-acoustics

Prof. Shein commented further on acoustical studies in the Soviet Union. They are apparently investigating the use of various echo sounders ranging from 10 KC to 200 KC and are deeply involved in acoustical counting procedures. Their equipment and approach seem to be similar to those now being used at Lowestoft by David Cushing's people and perhaps not as far along, but certainly well ahead of the U. S. push in this direction. The Soviets claim to be using now the world's largest crystals in their acoustical studies, particularly for the application of piezoelectrical effect for passive and active sound studies. According to Shein, they have developed a technique that allows the study of fish close to the seabed. My impression was that it was similar to the white line techniques used in other countries; however, it completely blocks out the bottom echo.

On the day following Shein's lecture, we went out on the Black Sea to have a first-hand look at the various acoustical equipment aboard the research vessel, "Boridev." It was literally a floating acoustical laboratory with twenty-some different echo-sounding devices--both foreign and domestic--and a variety of acoustical detection (listening) instruments. The vessel was not involved in the acoustical herding work described by Shein, but did have more electrical equipment aboard than all BCF vessels combined. On the other hand, I saw nothing in electronic equipment that impressed me as being substantially different or better than the rest of the world uses.

Opto-motor Reactions
and the Secondary Stimuli

For the next several days we heard a good deal about other physiological and behavioral studies being conducted by the Soviets, and there are areas of work worth mentioning. One uses the so-called opto-motor reaction to

improve catching efficiency. A lecture by D. S. Pavlov dealt with the opto-motor reaction and peculiarities of fish orientation in a stream of water.

The opto-motor reaction is a behavioral response that takes place in the animals following a visual moving object or reference point; it is characteristic of many classes of animals. The main biological significance of opto-motor reaction in fish is that it enables the animal to orient itself in a water stream, providing visual reference points are available. The opto-motor reaction is an unconditioned reflex or "reo-reaction" and occurs in early stages of a fish's development. It is a characteristic of the overwhelming majority of fishes, and occurs when fish do not have tactile contact with the bottom. Apparently, it is very important in midwater fishes and hence in midwater fishing activities. The Soviets are stressing the application of this knowledge to the harvest of midwater species. By altering the character of the background (webbing), it is expected that one can create an opto-motor reaction in certain parts of the trawl and eliminate it in others. This would eliminate swim-out, which now occurs in some midwater trawl fishing.

Increasing Harvest Efficiency

Pavlov was followed by D. V. Radakov, who also lectured on how knowledge of behavior could be employed to increase harvest efficiency. According to Radakov, the Soviets feel that escape from trawls, purse seines, and other active gears can be decreased by creating a "secondary stimuli." That is, if the fish's attention or sensory modalities are taxed by secondary stimuli, these may confuse and even inhibit the behavior that might lead to escape from a particular type of gear (this relates to acoustical herding). Apparently by creating certain predator sounds in an area around trawls, the tendency of fish to dart away from the gear in attempts to avoid it may be eliminated completely. The success of these studies, however, was not well-documented to the lecture group. It is an area being investigated.

CUBA'S FISHERIES DEVELOPMENT

At the end of our stay at Batumi, each participant was asked to give a short summary of his nation's fisheries development work. Here is some information I abstracted from the Cuban presentation.

Prior to 1959, the fisheries of Cuba were of a subsistence nature. There was no organized national effort to develop and utilize the fisheries potential surrounding the island. At that time, production was approximately 25,000 tons[1] and marketed through "middlemen." After the revolution, the fishermen were organized into cooperatives under a National Institute of Fisheries. This organization involves itself with catches, management of fishing fleets, marketing, distribution, and fisheries research.

32 Cooperatives Control 3,000 Boats

The Cuban fishing industry is organized into approximately 32 cooperatives, which control about 3,000 boats. About 50 vessels fish on the high seas. Eight modern stern trawlers have been acquired from Spain.[2] Fishing on Georges Bank has or was scheduled to begin in 1967.[3] Production in 1967 has exceeded 100,000 metric tons[4] and the target for 1970 is 175,000 metric tons. The breakdown of the 1970 planned catch, by species, although not clearly provided by the lecturer, was: 30,000 metric tons tuna; 40,000 metric tons trawl--hake, flounders, etc.; 50,000 metric tons cod; and 45,000 metric tons other.

The large new fishing port at Havana, which was financed by the Soviets and is staffed with Soviet technicians, now provides logistic support for most distant-water fishing activities. Closed circuit television is used to monitor port activities.

3 Labs Do Research

The research activities are coordinated by three laboratories: (1) marine biology, (2) oceanology, and (3) laboratory of fishing technology. There are now 56 Cuban scientists

1/FAO gives Cuba's 1959 production as 28,200 metric tons.--Ed.

2/Cuba bought 26 fishing vessels: 6 stern trawlers that fish for cod in the Northwest Atlantic, mostly off Labrador. The remaining 20 units bought from Spain were tuna longliners. (For details, see CFR, Jan. 1966, p. 71.)--Ed.

3/No Cuban vessels fished during 1967 on Georges Bank. A few were sighted on their way to or from Labrador.--Ed.

4/There is no evidence for this statement.--Ed.

assigned to these labs, 30 administrators, 90 crew members on research vessels, 16 Soviet scientists and 3 FAO scientists. The Soviets have provided two medium refrigerated trawlers as research vessels, apparently on loan from VNIRO, and 9 smaller ships ranging from 16-25 meters. The overall budget of the Cuban oceanographic and fishery research programs was said to be 1.2 million pesos in 1967.

(The fisheries development program obviously is being supported technically and financially by the USSR.)

MURMANSK, THE "BARREL CITY"

We went on to Murmansk. The city, which dates back some 50 to 60 years, now has 300,000 people. This in itself does not seem particularly important until one realizes that almost the entire population depends on the fishing industry, although there are also fur farms, small industries, and military activities in the region. The Murmansk fishing fleet operates from the North Atlantic west to the coasts of America. More than two billion pounds, or a million metric tons of fish, now are landed annually in Murmansk. The catch is made in the North Sea, the Faeroes, Icelandic region, Greenland, Newfoundland, and Georges Bank.

Fleet and Docks

The fleet is made up of many standard SRT-type side trawlers, BMRT's, and support vessels ranging up to 19,000 tons. We were given a tour of the docks and fishing facilities. Compared with those I have seen in other areas of the world, the Murmansk dock facilities are extremely modern. There are many railway-supported mobile cranes used to load and unload the large number of fishing vessels calling at Murmansk. The access to the docks appears good. The fishing fleet, particularly the support vessels, is modern.

We visited several SRT catcher vessels, several BMRT's, and a support ship. I was impressed by the fact that the skippers on all these boats were relatively young and acutely aware of what government people were doing in the area of fisheries. Of the half dozen or so vessels that I boarded, all but one were apparently foreign built; they were constructed in either Poland, East Germany, or Western Europe. Most were powered with German engines and had a large variety of Eastern and Western European electronic devices aboard.

Visit to Fish-Processing Plant

The study tour included a visit to one of the processing plants in Murmansk where a large variety of fish products was preserved. We observed smoking of redfish, cod, and catfish (wolf eels); filleting of various demersal (bottom dwelling) species; and lunched on about 22 different products made by the plant. Again, most processing machinery appeared foreign made. The plant did not seem particularly well laid out, and many activities were not automated. Safety features were entirely lacking. In contrast to the dock facilities and vessels, the plant seemed to me a rather inefficient operation, at least from the standpoint of using workers.

Barrels

One quickly becomes aware when moving around the docks or fish-processing plants, or even around the countryside, that there must be an awful lot of herring making their way in barrels to Murmansk. If there are 300,000 people in Murmansk, there are at least 30 million barrels. They are stacked every where: on the docks, throughout the city, and in the surrounding countryside. So I dubbed Murmansk, the "Barrel City."

PINRO

In addition to Murmansk's large fishing activities, one of the larger fisheries research laboratories is centered there. The PINRO lab or labs are in downtown Murmansk. A large building houses the labs involved in marine studies in the North Atlantic. The group at PINRO includes 600 persons, of which 200 are scientists, and the remainder staff technicians, secretarial help, etc. I was particularly interested in some work in fish behavior and the methods used to gain a better insight into this field.

Study Behavior of Demersal Fishes

We looked at a hydrostat being used to investigate the behavior of demersal fishes. For all practical purposes, the hydrostat can be considered a cylinder sealed at each end and with a number of ports for the observer. It has a maximum operational depth of 600 meters, and a life support system of approximately 12 hours. The hydrostat weighs 2.4 tons and can be operated from a vessel at drift or when anchored. Although it has its own oxygen and life support system, there is direct

contact via cable to the research vessel. The device is lowered much like the bathyscaph or sphere used by Beebe to a predetermined depth, and then observations are made on fish life. About 70 drifts had been made with this particular hydrostat by scientists at the PINRO laboratory. The drifts ran from four to eight hours. Generally, the device is lowered to within one to two meters of the seabottom, and observations made on demersal fishes as the hydrostat drifts slowly over the ocean seabed. A number of excellent photographs were shown to the study tour by Dr. Kiselev, who was one of the main investigators studying fish behavior from the hydrostat.

A Submersible

The PINRO lab has designed and apparently has now under construction a new, self-contained, independently operated, submersible. Called the "North I", it will have a depth capability of 2,000 meters and a speed of five knots. It will be assigned the investigation of fish behavior in their natural environment and their reaction to fishing gear. It also may play a role in fish detection and scouting. Although the fisheries submarine "Severyanka" still is in use, it is having increasing maintenance problems. Its use in future fisheries studies seems questionable.

PINRO Organization Impressive

I was impressed by the organizational structure at PINRO and how programs were designed and developed and related to the overall national goals of fish production. At least one-half the PINRO budget (2.5 million rubles or about $2.75 million) comes from the fishing industry, and the other half from the Fisheries Ministry's budget. This PINRO budget does not include research vessel support. Overall program planning and objectives are evaluated by industry and scientific leadership. It is obvious that the lab's mission is closely related to fish production and efficient utilization of the Murmansk fleet.

A relatively large group is involved in predicting changes in year-class strength for the various species exploited. The purpose of prediction does not concern management in the sense of regulation; it is applied to reallocate fleet deployment. Its purpose is to make the best use of the Murmansk fleet--to put greater emphasis in those areas where natural production looks favorable, and to diminish the effort on stocks in which natural production looks poor. How well this actually works is difficult to say.

BOROK'S BIOLOGICAL INSTITUTE

Our next stop was Borok, which is north and east of Moscow. Borok is a village of about 2,000 people and sits on the southwest side of the Rybinsk Reservoir. The whole town is built around the Academy of Science's Biological Institute for Inland Water Research.

The Biological Institute, directed by I. D. Popanov, was established in 1959 and is made up of independent laboratories. Some of the more important include Laboratory of Hydrology and Hydrochemistry, Laboratory of Microflora and Microbiology, Laboratory of Ecology and Physiology, Laboratory of Zooplankton and Zoobenthos, Laboratory of Zoology and Parasitology, Laboratory of Ichthyology and Physiology of Lower Invertebrates.

Electrical Fishing

While the group at Batumi apparently is directing its energy to using the anode reaction for capturing fish, at Borok they are experimenting with alternating current to stun fishes in front of a trawl. The objective involves agitation and electronarcosis. Electro-fishing was demonstrated on the Rybinsk Reservoir aboard the new 120' research vessel, which was well equipped with chemical and physiological laboratories and acoustical equipment. The electro-trawl displayed has a series of electrodes along the ground rope, uses AC power, non-pulsed. (Voltage and power output and other details can be obtained from the author.)

Dr. Poddubnii lectured on acoustical tracking. The work is similar to that conducted on salmon in the Pacific Northwest. However, the acoustical tag now being used on sturgeon and other species seems a little more sophisticated, and the tracking system allows one to record the position and depth of up to nine fish at the same time. The tag was built in somewhat of a saddle shape, with the power source on one side and acoustical transmitting equipment on the other. The Soviets had tracked the migration of sturgeon in the reservoir and in the Volga River, and suggested various methods the fish were using to orient themselves.

FAO - BERGEN

There were about 100 scientists at the conference of 30 nations, with strong representation from the Soviet Union (they sent a ship to Bergen from Murmansk), Great Britain, Germany, France, and Norway. Australia, Canada, and the U. S. were represented. There were individuals from all parts of the globe. The strongest laboratory representation came from PINRO, VNIRO, the Atlantic Research Institute for Marine Fisheries and Oceanography (ATLANTNIRO), the Marine Laboratory at Aberdeen, Scotland, and the Fisheries Laboratory at Lowestoft, England.

The conference was divided into five major topic sections: (1) field observations on fish behavior and important fisheries; (2) methods and techniques for studying fish behavior in their natural environment; (3) experimental studies of fish reactions to physical and biological stimuli, both in their natural and in a controlled environment; (4) experimental studies of fish reactions to moving and fixed objects in order to clarify reactions to fishing gear; and (5) application of observations and experiments on fish behavior in designing fishing gear and tactics.

The discussions were highlighted by differences in opinions, particularly concerning swimming speeds and the use of theoretical models for crystallizing needed inputs for improving the design of fishing devices. Work parties were organized to consider in greater detail: (1) use of submersibles in behavior studies; (2) short-term migration or movements of fishes--their effect on fishing strategy; (3) possibilities of herding, aggregating, and controlling and/or restricting movements of fish for the purpose of improving harvest; (4) sensory physiology--its possible contribution to behavior studies and design of fishing gear; and (5) experimental design of behavior studies and design of facilities.

Approximately 63 papers were submitted and will be published in the proceedings. The proceedings should be available early in 1968 in limited numbers and should provide an excellent reference for those interested in fish behavior, particularly as it might be applied to capture and harvest.

I was particularly impressed with the state-of-the-art of acoustical counting and its application to both behavior and population studies. Both English and Norwegian investigators are attempting to resolve the problem of acoustical signatures--identifying acoustical targets as to fish species. The Norwegians appear to be making some progress.

I suspect that the impact of the papers presented on the future of fisheries will be of more importance than that at many other conferences.

FISH GET ULCERS TOO!

Fish, like humans, have ulcer problems. Kenneth Higgs, field officer of the Metropolitan Toronto Conservation Authority, told an authority meeting that 250 dollars will be spent this year on drugs to keep fish in Authority ponds free of ulcers and other ailments. The Authority raises its own game fish. ("Current Affairs Bulletin.")

EXPERIMENTAL TRAWLING AND POT FISHING FOR GIANT ALASKAN PRAWN

By Doyne W. Kessler*

A research cruise sponsored jointly by industry and BCF was conducted to determine the feasibility of trawling for spot shrimp (Pandalus platyceros). New BCF-developed midwater trawls and combination systems employing standard trawls with hydrofoil doors were fished in areas of suspected spot shrimp concentrations. In 21 bottom drags, 689 pounds of spot shrimp were taken. Five days of shrimp pot fishing (47-50 pots per day) produced 929 pounds of marketable shrimp.

The availability of giant Alaskan prawn or spot shrimp (Pandalus platyceros) in southeast Alaskan waters has long been known to local fishermen. Unlike pink shrimp (Pandalus borealis) and side-stripe shrimp (Pandalopsis dispar), which occur in large concentrations over flat trawlable bottoms, spot shrimp seem to occur on rough, rocky bottom types where conventional trawls cannot be used. Consequently, commercial fishing gear has been limited to shrimp pots. Because of this fishing gear limitation, the spot shrimp fishery has remained a small operation producing shrimp mainly for home use and, occasionally, for the fresh shrimp market.

Interest in commercial fishing for spot shrimp has expanded within the last few years. The large size, superior quality, and year-round availability make this shrimp ideal for an off-season small-boat fishery. BCF is now conducting exploratory fishing and gear research studies to delineate the distribution and abundance of spot shrimp--and to determine the most efficient type of gear for harvesting this valuable resource.

The research cruise represented the first commercial shrimping for research purposes in Alaska. It was made in April and May 1967. The project was initiated by a commercial fisherman, Bruce Joyce, skipper-owner of the vessel "Bull Moose," of Bellingham, Wash. He felt that spot shrimp may exhibit a diurnal vertical movement. Nakat Packing Company furnished the "Nancy Rose," skippered by John Kristovich of Ketchikan, Alaska, a veteran of more than 10 years of spot shrimping. The BCF Exploratory Fishing and Gear Research Base at Seattle, Wash., furnished hydrofoil doors, a telemetry system, several trawl nets, and a gear expert during the first part of the cruise. The BCF Exploratory Fishing and Gear Research Base at Juneau, Alaska, furnished technical assistance during the second phase. This cruise was a commercial operation run by commercial fishermen.

This report gives the results of the Nancy Rose cruise.

EXPERIMENTAL TRAWLING

The first part of the cruise was an attempt by commercial fishermen to capture spot shrimp using various trawls and the telemetry system that was developed by the BCF Seattle base.

Methods and Gear

Drags were made in several bays and inlets in the Ketchikan area of southeast Alaska where previous fishing with shrimp pots had indicated concentrations of spot shrimp (fig. 1). Because most of these areas were too rocky for trawling with conventional gear, systems that use hydrofoil doors, telemetry equipment, and standard and experimental trawls were tried. By positioning the trawl off bottom, it was possible to fish areas too rocky for conventional trawling. Surprisingly, some areas of rough bottom could be trawled on bottom using this system. The following trawling gear was used:

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1. 40-foot flat shrimp trawl.
   hydrofoil doors
   8 - 8-inch diameter plastic floats (17 floats used on first five tows)
   50 pounds of weight on footrope

2. 72-foot semiballoon Gulf of Mexico shrimp trawl.
   hydrofoil doors
   40 pounds of weight on footrope (removed for some tows)
   10-fathom bridles

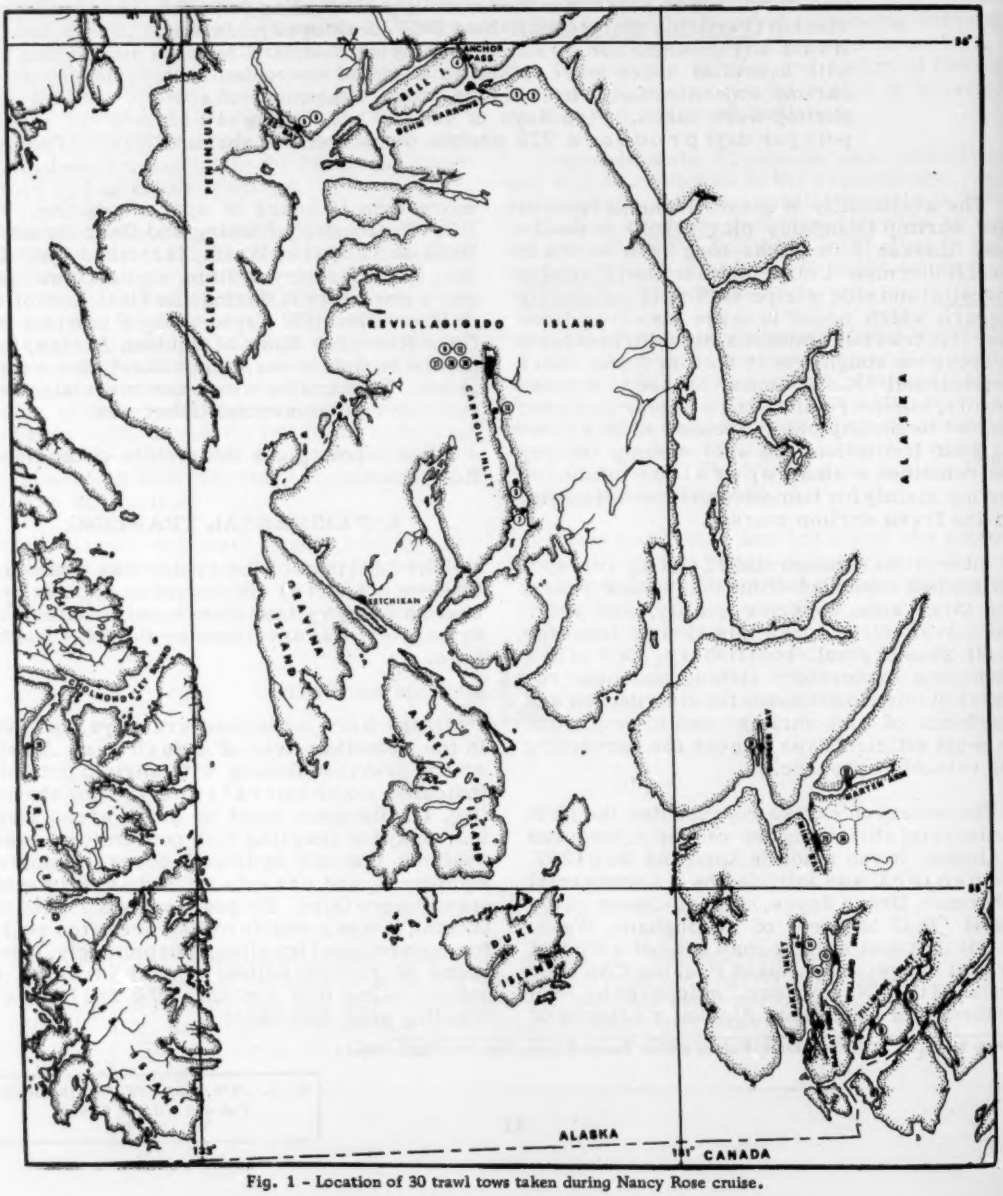

Fig. 1 - Location of 30 trawl tows taken during Nancy Rose cruise.

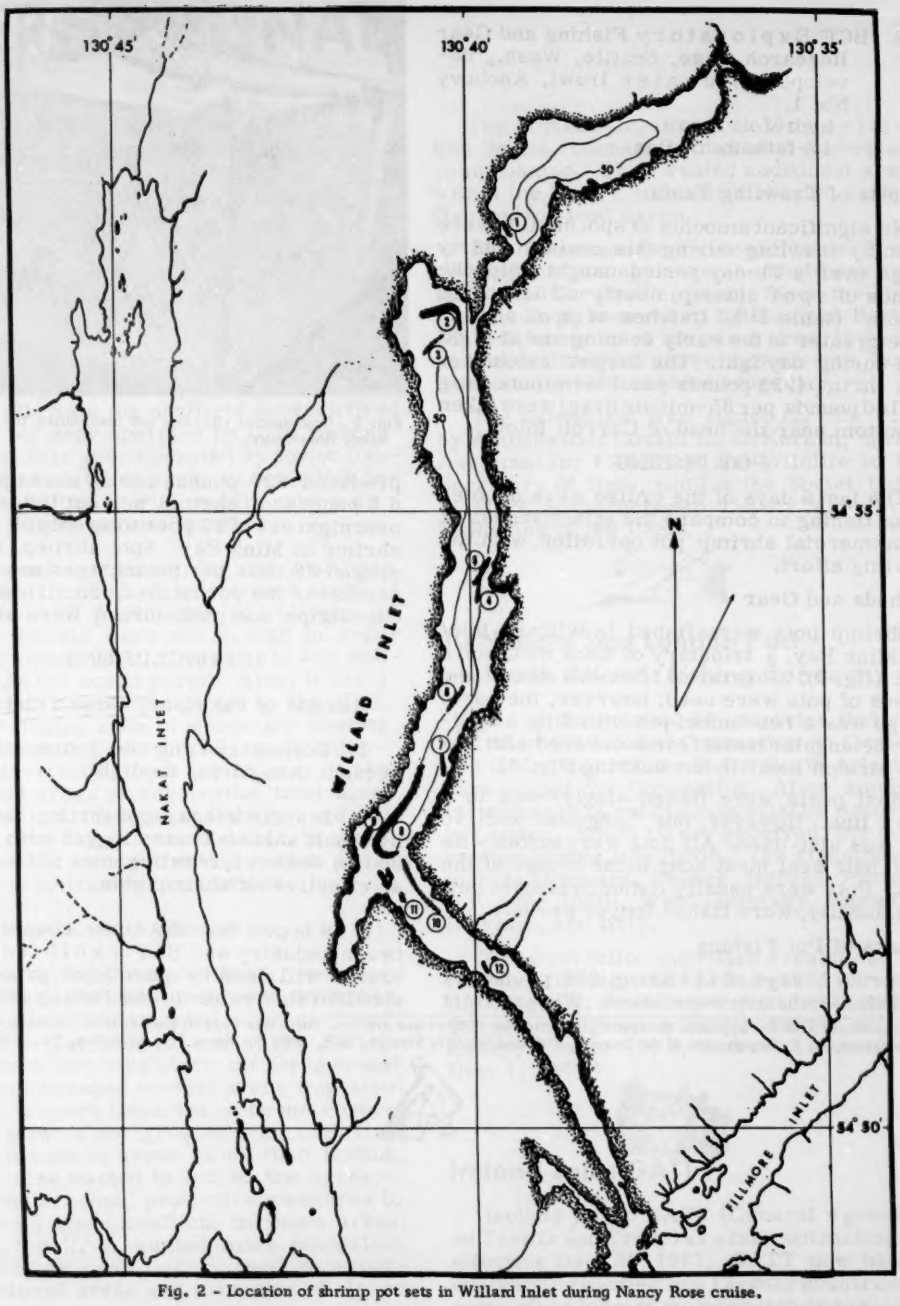

Fig. 2 - Location of shrimp pot sets in Willard Inlet during Nancy Rose cruise.

3. BCF Exploratory Fishing and Gear Research Base, Seattle, Wash., developed midwater trawl, Anchovy No. 1.
   hydrofoil doors
   10-fathom bridles

Results of Trawling Tests

No significant amounts of spot shrimp were taken by trawling during this cruise. Thirty drags over a 21-day period caught only 689 pounds of spot shrimp, nearly all taken "on bottom" (table 1[1/]). Catches of spot shrimp were greater in the early evening and at night than during daylight. The largest catches of spot shrimp (225 pounds per 105-minute drag and 160 pounds per 85-minute drag) were taken on bottom near the head of Carroll Inlet.

POT FISHING

The last 6 days of the cruise were devoted to pot fishing to compare the effectiveness of a commercial shrimp pot operation with the trawling effort.

Methods and Gear

Shrimp pots were fished in Willard Inlet and Mink Bay, a tributary of Boca de Quadra Inlet (fig. 2). Several different sizes and shapes of pots were used; however, the basic design was a two-tunnel pot with 2 by 3 by 3-foot rectangular metal frame covered with 1¾-inch stretch mesh nylon webbing (fig. 3).

Most posts were fished singly--one to a buoy line. However, one "longline" with 10 pots was also used. All pots were baited with fresh hair seal meat hung in the center of the trap. Pots were usually fished overnight but, occasionally, were fished longer periods.

Results of Pot Fishing

During 5 days of fishing, 985 pounds of marketable shrimp were taken. Willard Inlet produced 929 pounds for an average catch of 6.5 pounds of shrimp per pot (table 2[1/]). An overnight set of 47 pots took only 56 pounds of shrimp in Mink Bay. Spot shrimp, which averaged 22 tails per pound, were more than 90 percent of the pot catches. Small quantities of coonstripe and pink shrimp were also taken.

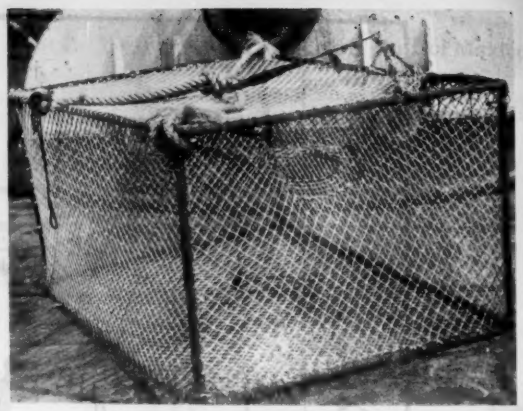

Fig. 3 - Commercial shrimp pot used during the last phase of Nancy Rose cruise.

CONCLUSIONS

Results of the Nancy Rose cruise show:

1. Bottom trawling took more spot shrimp at night than during daylight.

2. In some areas, spot shrimp can be taken by small shrimp trawls rigged with hydrofoil doors; however, trawling does not seem to be as effective as shrimp pots.

It is hoped that the close cooperation between industry and BCF exhibited by this cruise will lead to more joint projects with considerable value to the fishing community.

1/All statistics are in the appendix to reprint (Separate No. 806) of this article. For a free copy of the Separate, write to Office of Information, U. S. Department of the Interior, Fish and Wildlife Service, BCF, 1801 N. Moore St., Arlington, Va. 22209.

INTERNATIONAL

U. S. and USSR Extend Fisheries Agreements

The United States and the Soviet Union agreed on Dec. 18, 1967, to extend for one year the provisions of two fishery agreements concerning the northeastern Pacific Ocean. Talks leading to the extension began in Washington, D. C., on Dec. 7.

The first, a 3-year Kodiak (Alaska) agreement, was signed Dec. 14, 1964. It was designed to alleviate the conflicts between fixed king crab pot gear operated by U. S. fishermen and mobile gear operated by Soviet fishermen. It established areas near Kodiak Island in which fishing with mobile gear was forbidden during certain months.

The second agreement, for one year, was signed Feb. 13, 1967. It established areas of the high seas off Washington and Oregon in which the Soviets were not to fish in order to permit access of U. S. vessels to key fishing grounds for ocean perch. Also, it designated certain areas contiguous to the U. S. exclusive fishing zone in which the Soviets would not fish to protect U. S. sport fisheries and other small-boat operations. It also established areas of substantial total size within the U. S. contiguous fishery zone, particularly near the Aleutian Islands, in which Soviet vessels were permitted to fish and/or conduct cargo transfer operations.

Both Nations Desired Changes

In considering the agreements, each side thought some modifications were desirable. The U. S. delegation wanted expansion and additions to high-seas areas where Soviet fishing does not take place off Oregon and Washington because certain areas important to the U. S. trawl fisheries were not covered. Also, in view of the growing king crab fisheries in Alaska in areas other than Kodiak, the U. S. also wanted to add to the agreement some seasonal protective measures to minimize gear conflicts in these areas. Further, the U. S. wanted more protection for the Kodiak crab fishery through expansion of closed areas and extension of closure period.

The Soviet delegation took the position that Soviet concessions had been inadequately compensated. They wanted additional areas within the U. S. contiguous fisheries zone to fish and/or load cargo.

The discussions were inconclusive. It was decided that the agreements should continue unchanged for another year. Since the king crab quota agreement in the Eastern Bering Sea will come up at the same time, it was understood that all three agreements would necessarily be considered together.

The agreement was signed for the U. S. by Ambassador Donald L. McKernan, Special Assistant for Fisheries and Wildlife to the Secretary of State, and for the Soviet Union by M. N. Sukhoruchenko, Deputy Minister of Fisheries of the USSR.

10 Nations Sign London Pact on North Atlantic Fishing Conduct

Ten of the original 18 countries that established the London Convention on Conduct of Fishing Operations in the North Atlantic have signed the Convention. After signing, instruments of ratification must be deposited in London. When 10 are received, the Convention comes into force. The signatories include Denmark, France, Ireland, Portugal, U.K., the USSR, West Germany, Norway, Belgium, and Italy.

The Convention specifies regulations for marking fishing vessels and gear, sound and light signals, vessel operation, and mutual inspection of fishing vessels beyond national fishery limits. (U. S. Embassy, Copenhagen, Dec. 1, 1967.)

Ireland Joins GATT

Ireland joined GATT (General Agreement on Tariffs and Trade) as a full contracting party effective Dec. 22, 1967. GATT now has 75 contracting parties and 12 other countries with some other form of membership or association.

FAO Plans Conference on Port and Marketing Facilities

FAO is aware of the need to improve port handling and marketing facilities to handle increased catches. Some developing nations are not benefiting fully from larger catches because they are unable to handle them at the port and distribute them. Some developed nations face the same difficulties.

To help alleviate this problem, FAO is planning to hold a special congress in Bremen, Germany, in September 1968. The subjects will include: planning ports, investments needed, administration and operation, and the building of facilities.

Report on World Fish Meal Production

The International Association of Fish Meal Manufacturers (IAFMM) is the source for the following data on world fish meal production:

	July 1967	Aug. 1967	Sept. 1967	Jan.-Sept. 1966	
	(Metric Tons)				
Canada	15,928	12,864	8,444	72,901	70,512
Denmark	17,482	19,981	15,290	114,164	83,338
France	1,100	1,100	1,100	9,900	9,900
German Federal Republic	6,891	6,588	6,609	56,653	55,207
Sweden	414	1,040	987	5,197	3,864
United Kingdom	7,714	6,641	5,847	60,713	66,310
United States	31,014	26,031	14,326	137,009	141,358
Angola	3,511	1/	1/	2/24,118	36,211
Iceland	18,232	13,331	17,631	93,956	121,489
Norway	33,527	51,018	39,904	406,793	355,704
Peru	524	699	51,673	1,082,158	1,105,111
So. Afr. (including S.-W. Afr.)	35,975	37,470	42,920	331,188	245,221
Belgium	375	375	375	3,375	3,375
Chile	13,457	6,158	11,588	98,851	183,133
Morocco	1/	1/	1/	1/	21,300
Total	186,144	183,296	216,694	3/2,496,976	2,502,033

1/Data not available.
2/Data available only for January-July 1967.
3/Includes production in Angola through July only.
Note: Japan does not report to IAFMM monthly fish meal production. Estimate for 1967 of fish meal and other animal meal (mostly fish meal) is 350,000 metric tons; 347,000 metric tons in 1966. (Foreign Agricultural Service, Tokyo, Nov. 15, 1967.)

Food Protein Will Be Extracted from Crude Oil

The British Petroleum Company (BP) has announced that it will build a factory to extract food protein from crude oil. It would be used first in animal feeds, much like fish meal and herring meal, but it is expected that ultimately the product can be used in human foods. Construction of the factory will begin in 1968, near Marseilles, France, and production will be initiated in 1970. The factory will cost 45 million Danish kroner (US$6,000,000) and have a capacity of 16,000 tons of protein concentrate annually.

A Competitive Product

The concentrate resembles fine brown sugar and will be competitive with natural products of the same quality. The company states that 100 tons of crude oil yield 90 tons of fuel oil and 10 tons or protein concentrate. The new process is expected to have a significant influence on the world food problem because the protein shortage could be made up by only two percent of the world's annual production of crude oil. Other petroleum companies are also working to produce protein from petroleum. ("Børsen," and "Berlingske Tidende," Nov. 22, Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 24, 1967.)

FOREIGN

CANADA

EXPERIMENTAL MIDWATER TRAWLING PRODUCES LARGE HAULS

A typical Nova Scotia 100-foot scallop dragger, converted to midwater trawling, made a 121,000-pound catch of pollock in one short tow in mid-November 1967. It was the spectacular culmination of a 5-month project carried out jointly by the Federal and Nova Scotia Governments and the fishing industry. A single haul of demersal (bottom-dwelling) fish never before was made on Canada's east coast by a vessel this size.

The huge drag was one of 4 that loaded the vessel, the "Lady Anna," with 207,000 pounds of pollock. Fishing on the eastern edge of Stellwagen Bank, she made her catch in 13 hours of fishing and 4 hours of actual dragging time. The length of the drags varied from 20 minutes to two hours. Catches were made in 32-34 fathoms. The fish were taken from one to 15 fathoms off sea bed.

The first drag yielded 40,000 pounds, the second 16,000, the third 30,000--and the fourth the 121,000-pound haul.

German Vessels Use Trawl

Midwater trawling for herring has been successfully carried out by very large German vessels. Lady Anna's net is as large as theirs, although the vessel is considerably smaller. It is powered by a 765-hp. diesel engine. Special deck machinery was installed for the project. Superstructure changes were necessary to accommodate the midwater trawl, which is shot and towed over the stern although the cod end is emptied over the starboard side.

The Lady Anna's success is an important breakthrough in the Atlantic herring fishery now expanding rapidly. While fishing for herring in the Bay of Fundy and on Georges Bank, the Lady Anna made numerous single hauls of 40 to 50 tons of spawning herring. Until 1967, herring never had been taken in commercial quantities by midwater trawl off Canada's east coast by Canadian vessels.

The Net

The net used is a 1,400-mesh German midwater trawl, 300 feet long and 70 feet wide. Its opening is spread by two hydrofoil otter boards, each about 1,400 pounds. The vertical opening varies with the speed of the boat from 36 to 70 feet, but the opening for catching fish usually is about 48 feet. (Department of Fisheries, Canada, Nov. 23, 1967.)

* * *

HERRING PRICES TUMBLE IN BRITISH COLUMBIA

Herring prices in October 1967 were dropping in British Columbia (B.C.) because the market for B. C. herring fish meal and oil had dwindled. In contrast, supplies of Peruvian and Norwegian fish meal products, vegetable oils, and other marine oil products had increased. Members of the Fisheries Association of B. C. offered herring fishermen C$9.60 a short ton, compared with C$17.60 paid since 1965. (Exvessel prices for herring in B. C. are not comparable to those of certain other countries because B. C. processors furnish much of the equipment used in the fishery, along with benefits such as a medical plan.)

The herring fishery industry was having marketing and price problems because of a continued increase in operating costs. Such conditions were expected to continue throughout the rest of the herring season. ("Facts on Fish," Fisheries Association of B. C., Oct. 26, 1967.)

* * *

FISHERY LANDINGS IN ATLANTIC PROVINCES EXPECTED TO INCREASE

Canada's Atlantic Provinces' fishery landings will increase an estimated 2-3 percent per year between now and 1970, according to a government report. This growth rate is slightly higher than the last decade's. An average 2-percent growth is forecast from now to 1980.

Obstacles to catch increases are limitation of fish stocks and increased international

Canada (Contd.):

competition for the resources. (U. S. Embassy, Ottawa, Nov. 23, 1967.)

* * *

FISHERIES TRENDS, JANUARY-AUGUST 1966-67

Canadian sea fisheries landings (including Newfoundland's) from January through August 1967 were 1.5 billion pounds with an exvessel value of C$96.1 million. (Excludes seaweeds.) In the 1966 period, landings were 1.6 billion pounds worth $107.1 million. These data are in the August 1967 "Monthly Review of Canadian Fisheries Statistics."

The landings and exvessel values of principal species were:

	January-August			
	1967	1966	1967	1966
	Landings		Value	
	. . (1,000 Lbs.) . .		. . (1,000 C$) . .	
Atlantic Coast:				
Cod	393,931	442,019	17,228	19,491
Haddock	78,500	81,558	5,226	5,825
Pollock	23,008	24,217	898	967
Flounder & sole	156,250	136,592	5,241	4,585
Herring	475,900	256,685	5,145	2,915
Ocean perch	84,483	103,608	2,189	2,832
Swordfish	2,711	3,126	1,361	1,511
Lobsters	27,437	28,890	17,491	16,474
Scallops	8,799	12,305	4,818	4,747
Pacific Coast:				
Halibut	19,917	30,674	4,988	10,977
Herring	100,453	166,652	1,674	2,780
Salmon	99,416	136,755	29,248	32,706
Cod	7,769	18,636	545	1,291

* * *

REINSTATES DOGFISH MARKETING ASSISTANCE PLAN

Canada's marketing assistance program to produce dogfish flaps, initiated in 1966, was scheduled to be reintroduced toward the end of 1967. The assistance will be payment to fishing companies of a maximum of 11 Canadian cents a pound on production of skinned dogfish flaps. Companies are required to pay fishermen a minimum of C$50 a short ton for round fish, or 13.5 cents a pound on unskinned dogfish flaps, on a delivered basis, for all dogfish purchased under this plan.

Money Provided

A total of $24,000 has been made available. This will provide for the production of about 200,000 pounds of dogfish flaps.

There is a ready market in Germany for these flaps. Companies also are hopeful of selling some skinned carcasses in the United Kingdom. (Department of Fisheries, Canada, Nov. 23, 1967.)

* * *

FOOD AND DRUG DIRECTORATE SAYS FPC CAN BE WHOLESOME

The Food and Drug Directorate of Canada's Department of National Health and Welfare is satisfied that fish protein concentrate (FPC) can be made from whole fish, and that it can be wholesome, nutritious, and safe. In Canada, as in the U. S., the presence of viscera, intestines, and other parts not normally used in preparing a food for humans was once considered objectionable by some people.

Will Not Violate Food & Drug Law

The section of the Food and Drugs Act stating that no person shall sell food consisting wholly or partly of any disgusting material has been the authority under which sale of a food could be prohibited. However, officers of the Food and Drug Directorate now believe it is possible to manufacture FPC from whole fish that would not violate the section. Other sections of the Food and Drug Act will require amendment when FPC becomes available in Canada. (Department of Fisheries, Canada, Oct. 25, 1967.)

EUROPE

Norway

REPORT ON CANNED SARDINE INDUSTRY

Production of brisling this season should be about 550,000 cases ($\frac{1}{4}$'s), a larger number than the last three-year average of 430,000 cases. However, during recent years, exports and home sales have been about 500,000 cases (they were fewer in 1965). Production, therefore, is not larger than needed to maintain sufficient stocks of various kinds for carryover into the new production season.

It is not possible to forecast what the remaining refrigerated quantity of raw material will give of the various types of cans. As matters now stand, stocks of $\frac{1}{16}$ brisling are too small, and stocks of cross-packed have not reached the necessary quantity either. Up to now, sales of brisling for export are about 45,000 cases lower than at the same time last year. This is due almost exclusively to smaller sales to Great Britain. The U. S. and Canada are about on last year's delivery levels.

Sild Production Lags

The situation is different for small sild: production does not keep pace with sales. Since the end of May 1967, stocks have been decreasing despite producers' interest in obtaining raw material. Stocks are now much lower than normal for this time of year. Even if production were intensified for the remainder of the season, it would be difficult to fill stocks sufficiently. Recently, it also has been difficult to obtain raw material. This is still true for small fish for $\frac{1}{16}$ cans and for cross-packed. At the same time, it has not been possible to obtain any considerable quantity of $\frac{1}{4}$ club sardines, for which there is some interest.

Exports to Several Markets Up

There is a marked increase of exports to several markets--South Africa and Sweden, and especially to the U. S. The increase to the U. S. may have resulted in part from Maine's poor fishing and reduced sardine production. On the other hand, sales to West Germany have decreased notably, from 50,000 cases to 40,000 cases in 1966. By the end of August 1967, only 17,500 cases had been exported. The 1967 quantity will probably be reduced to 25,000-30,000 cases. However, total exports, as of September 9, were the largest since 1950. ("Norwegian Canners Export Journal," Oct. 1967.)

* * *

REFRIGERATED-SEA WATER VESSEL BUILT

The first fishing vessel in Europe to feature the refrigerated-sea water (RSW) system for tank transport of catches is a 170-ft. purse seiner launched recently in Norway. Catches will be transported from the fishing grounds in refrigerated sea water in 9 tanks with a combined capacity of about 630 tons. Herring can be kept aboard without deterioration for six days; mackerel for 12 days; tuna for 14 days. The 6-million-kroner vessel (almost US$860,000) is scheduled to be delivered to Norwegian owners in January 1968. It features also a new sea-water circulation system developed by the builders. (Export Council of Norway Press Service, Nov. 1967.)

* * *

SALMON FISHING IS GOOD

Because of poor salmon catches in the Baltic during spring 1967, two Swedish vessels sailed to Bodø in north Norway to fish the Norwegian Sea. About 10 Danish cutters also were there. All made good salmon catches. One Swedish vessel caught 6 tons of salmon in 3 months; the fish were sold in Denmark. It is expected that several Swedish salmon boats will fish the north Norway salmon grounds next spring. ("Berlingske Tidende," Nov. 5, 1967; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 24.)

* * *

REPORT ON EXPORT TRENDS OF FISHERY PRODUCTS

Norwegian exports of frozen fillets for Jan.-Sept. 1967 declined about 7 percent from the 1966 period. Shipments of herring, cod, and haddock fillets declined significantly.

Canned fish exports through Sept. were 20,276 metric tons, slightly below comparable 1966 shipments. Exports of small sild sardines were up about 10 percent, but brisling

Norway (Contd.):

shipments were down 22 percent. The main canning season for brisling and sild sardines begins in the spring.

Product	Jan.-Sept.	
	1967	1966
	. . (Metric Tons) . .	
Frozen fillets:		
Haddock	7,792	10,912
Cod	19,571	20,792
Coalfish	15,423	13,512
Herring	6,481	8,207
Other	4,953	4,674
Total frozen fillets	54,220	58,097
Frozen herring	8,829	12,365
Canned fishery products:		
Brisling	4,358	5,619
Small sild sardines	9,727	8,784
Kippers	2,478	2,429
Shellfish	389	568
Other	3,324	3,452
Total canned fish	20,276	20,852
Fish meal	341,193	183,121
Herring oil, crude	89,371	49,195

Industrial Fish

Norwegian exports of fish meal through Sept. 1967 were up 86 percent from 1966. The large stocks on hand at the start of 1967 contributed to the gain. Landings of fish for industrial purposes continued at a high level in early 1967. Fish meal output was running slightly ahead of first-half 1966. The gain was due to larger landings of capelin and mackerel. ("Fiskets Gang," Oct. 26, 1967, and Oct. 27, 1966.)

* * *

BIGGEST FISHING VESSEL COMPLETED

A 1,560-GRT stern trawler has been delivered to a Norwegian fishing company. The 20-million-kroner (US$3 million) vessel, biggest in the fishing fleet, is equipped to produce a maximum of 60 metric tons of fillets a day. The freezing rooms can store 1,300 tons of fillets. The trawler now is being tested on various fishing grounds. (Export Council of Norway, Nov. 1967.)

Denmark

REPORT ON FISHING INDUSTRY, JAN.-SEPT. 1967

Landings of fish in local ports by Danish craft during January-September 1967 were 808,000 metric tons--about 28 percent above the 1966 period. Landings of both cod and flatfish were up about 10 percent over the 1966 period; catches of herring and brisling were up 35 percent. Catches in the "other fish" category (includes such industrial species as sand eels and Norway pout) were up 60 percent. The supply of pond trout was little changed from 1966.

Landings in Danish ports by foreign vessels were up about 10 percent--to 134,000 tons from the 121,000 tons of 1966.

Production of Processed Products

There was a 12-percent increase in production of sterile canned items, to 9,800 tons, and a 10-percent decrease in fresh and frozen fillets, to 66,000 tons. Since 1967 landings of cod and flatfish of approximately 176,000 tons were about 10 percent higher than in the 1966 period, the decline in fillet production shows further diversion of those supplies to fresh fish markets. This became evident during the previous 3 months and continues to reflect the price decline in western markets for frozen blocks of cod fillets.

Heavy landings of industrial fish in January-September 1967 resulted in a 44-percent increase over the 1966 period in production of fish meal, oil, and solubles. Fish meal production was 107,000 tons and oil about 44,000 tons.

Exports

Although fishery exports in Jan.-Sept. 1967 increased 13 percent in quantity over the 1966 period (259,000 tons to 292,000 tons), value increased less than 2 percent. For edible products, decline in value was produced primarily by the substantial drop in value of fillets exported.

Among industrial products, declines in value of fish meal and oil exports reflected price drops in 1967 of around 25 percent from January-September 1966. The quantity and value of pond trout exported were up slightly. The sterile canned category continued to show a 20-percent increase in quantity and a 10-percent increase in value over the previous year.

Exports to the U. S.

All categories of fishery exports to the U. S. declined in 1967 from the 1966 period,

Denmark (Contd.):

except canned products. These showed a slight increase in quantity but a decrease in value.

Total fishery exports to the U. S. in Jan.-Sept. 1967 totaled 5,600 tons, compared with 7,000 tons a year earlier. Frozen cod-fillet blocks exports predominated: 4,000 tons, down 28 percent in quantity and over 40 percent in value. Although this decline is substantial, the figures reflect improving U. S. market conditions during the third quarter of 1967; the January-June data had shown declines of 60 percent in quantity and 70 percent in value compared with the 1966 period.

Exports of pond trout, the other major frozen commodity shipped to the U. S. in 1967, nearly doubled the 1966 period's in quantity and value.

Shipments of canned sprats, herring, and mussels all increased in quantity, although values were little changed. Shrimp, the other major canned item purchased by the U. S., declined in quantity and value. The first 1967 Danish export to the U. S. of an industrial fish commodity occurred during the third quarter when 50 metric tons of fish solubles were shipped. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 13, 1967.)

* * *

NEEDS FISHING VESSEL CREWS

About 75 cutters fishing for edible fish and 25 fishing for industrial fish in the Danish west Jutland port of Esbjerg are either without crews or are very poorly manned. The situation is said to be similar in all major Danish fishing harbors. Some large North Sea cutters have sailed to the dangerous Fladen Ground with only 2 crew members aboard. Many men left fishing when better-paid jobs were readily available ashore; there are many who could be reemployed readily on the cutters. The situation has become so serious that many vessel owners may have to cease operations. ("Vestkysten," Nov. 2, 1967; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 26.)

* * *

STORM DAMAGES US$2 MILLION WORTH OF FISHING GEAR

Denmark's 12,000 pound-net fishermen have totaled their losses from the hurricane that struck northern Europe on Oct. 17, 1967. Immediately following the storm, it was estimated that 75 percent of the pound-net gear had been destroyed. Questionnaires were sent by the Danish fishermen's association to provide a basis for estimating the total loss. It now has been calculated at US$2 million.

The Losses

About half the estimated loss was for lost and damaged nets and piling; the remainder resulted from loss of fishing time and catch. Some pound-net fishermen, including two of the largest, lost all their gear.

The association hopes to take up the matter of disaster assistance with the Ministry of Fisheries in the near future. Pound-net fishermen normally ready their gear for the spring fishery during winter. So action should be taken soon. The yearly production from the Danish pound-net fishery is worth about US$5 to $7 million. ("Borsen," Dec. 7, 1967; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Dec. 8.)

* * *

FAROESE MAY LOSE CANADIAN FISHING GROUNDS

Faroese fishermen may lose valuable cod fisheries off Canada because of the latter's new 12-mile fishing limit. These fishing operations provide incidental catches of porbeagle. Canada has carried on bilateral negotiations with 8 countries that will be affected by the extension of fishery limits: Norway, Denmark, France, Great Britain, U. S., Spain, Italy, and Portugal. The only Danish fishermen affected by the revision are those of the Faroe Islands. ("Politiken," Nov. 20, 1967; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 24.)

* * *

EXPORTS MUSSELS TO THE NETHERLANDS

A new fishery for blue mussels (Mytilus edulis) has developed at the Danish west coast port of Esbjerg. Dredge catches are brought to Esbjerg from the fishing grounds at nearby Ho Bay. Then, using an old gravel sorting machine, the mussels are cleaned and sorted.

The fisherman who initiated the enterprise has contracted to supply 20 metric tons of

Denmark (Contd.):

mussels a day. He found the Dutch would pay three times the price per ton now paid in Denmark. He has leased 2 cutters and his operation employs 10 men. Dutch importers send trucks to Esbjerg to transport the mussels to Holland. ("Vestkysten," Nov. 13, 1967; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 26.)

Netherlands

FISH OIL PRODUCTION AND IMPORT INCREASE

Production of fish oil by the Netherlands for first-half 1967 of 865 metric tons was up about 8 percent from Jan.-June 1966; imports more than doubled--64,019 tons compared with 31,588 tons. The doubled imports of fish oil resulted from low prices for Peruvian fish oil; most imports went into stocks.

Fish oil exports were off from 1,760 tons in the first 6 months of 1966 to 1,304 tons in 1967. Exports dropped in favor of hydrogenated oil exports, which consist chiefly of evaporated fish oil. Stocks on hand of 23,241 tons, as of July 1, 1967, were appreciably above the 17,765 tons in 1966. (U. S. Foreign Agricultural Service, Hague, Nov. 22, 1967.)

United Kingdom

DEVALUATION IS MIXED BLESSING FOR FISHING INDUSTRY

Devaluation of the British pound sterling will be a mixed blessing for the fishing industry. It should affect favorably the demand for British-caught fish. But its possible effects on industry costs are not so favorable, particularly on fuel oil, the second highest cost in fishing vessel operation. If wage increases are restrained, however, there should be a distinct short-term improvement in industry earnings. British exporters now have a substantial advantage over exporters from other fish-producing countries that have not devalued their currencies. ("Fishing News," Nov. 24, 1967.)

Imported Fish More Expensive

Imported fish will be more expensive, but Britain is not a large importer of fish products. The U. S. imports very little from her. But in 1966, the U. S. shipped to the U. K. a little more than 21 million pounds of edible fishery products worth US$14 million. Since British importers will have to pay more pounds for those same imports, they probably will reduce purchases.

* * *

WHITE FISH AUTHORITY RAISES INTEREST RATES ON FISHERY LOANS

The White Fish Authority of the United Kingdom changed interest rates on loans effective September 9, 1967.

Fishing vessels, new engines, nets, and gear:

On loans for not over 5 years: 7 percent, increase $\frac{1}{8}$ percent.

On loans for over 5 years but not more than 10: $7\frac{1}{4}$ percent, increase $\frac{1}{8}$ percent.

On loans for over 10 years but not more than 15: $7\frac{3}{8}$ percent, increase $\frac{1}{8}$ percent.

On loans for over 15 years but not more than 20: $7\frac{3}{8}$ percent, no change.

Processing plants:

On loans for not over 20 years: $7\frac{3}{4}$ percent, increase $\frac{1}{8}$ percent.

The rates on loans made before September 9 remained unchanged. ("Fish Trades Gazette," Sept. 23, 1967.)

France

EXPERIMENTAL TUNA FISHING IN MEDITERRANEAN

Experimental tuna seining for 45 days in the Gulf of Genoa, mostly between Nice and Corsica, produced very satisfactory results. In August 1967, 400 tons of tuna were caught by 2 vessels fishing about 30 miles offshore. As soon as the news reached the southern ports, about 20 other vessels sailed for Nice from Port-Vendres, Agde, Marseilles, and other ports.

France (Contd.):

Fishermen have caught at the same time in the same schools both "red tuna" (bluefin) and "germon" (yellowfin). The greatest part of the catch was sold in the fresh fish markets of southwest France. Part was sent to the canneries of the west because there are no canneries in southern France.

2 Tuna Migrations

Observations indicate that two migrations of tuna take place in the Gulf of Genoa--in the spring and in the summer.

The same observations have been made on the coast of Port-Vendres, where tuna fishing seems to be developing.

Until recently, the Gulf of Fos, near Marseilles, was the principal center of tuna fishing. But it seems to be deserted more and more by schools of fish. Both fishermen and ichthyologists have observed that the tuna have been scared off by work on the new port of Fos-sur-Mer, where mines are frequently set off. ("France Peche," Oct. 1967.)

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FISHING FLEET NEARED
14,000 VESSELS AS 1967 BEGAN

The French fishing fleet totaled 13,906 vessels (287,992 gross tons) with a total of 908,676 horsepower on Dec. 31, 1966.

The number declined by 749 from 1960 to 1965 but increased by 340 in 1966. Small vessels (under 50 tons) and very large ones (over 500 tons) accounted for the rise.

Growth of Fleet Over Past 6 Years

Date	Number of Units	Overall Gross Tonnage	Aggregate Power
Dec. 31, 1960	14,315	255,181	687,850
Dec. 31, 1965	13,566	287,776	880,556
Dec. 31, 1966	13,906	287,992	908,676

Tonnage Increases

Overall gross tonnage increased between 1960 and 1966 by 32,811 tons, or 12.8 percent. It did not vary appreciably in 1966. The increase in tonnage of large craft and 25- to 50-ton vessels was compensated for substantially by the decline in tonnage of medium craft. The decrease in 25- to 50-ton vessels was particularly evident. The aggregate tonnage of very small craft has not varied significantly.

Power Capacity Changes

Fluctuations in power capacity have been more considerable than those involving number and size of vessels. The overall power capacity of the fishing fleet increased by 32 percent between 1960 and 1966, and by 3.2 percent during 1966, corresponding to an additional 28,120 horsepower. Despite its size, this is less than the average increase of the 5 preceding years, which had been 39,700 horsepower. ("La Peche Maritime," Aug. 27, 1967.)

West Germany

FIRMS TO LEASE FISHING CUTTERS

Fisheries enterprises in Bremerhaven and Cuxhaven, West Germany, are interested in leasing under advantageous conditions Icelandic, Norwegian, and Faroese cutters for use in the herring fishery. An inquiry about renting 30 cutters has been sent to Norway and one regarding 10 cutters has been sent to Iceland. One fishing boat owner in the Faroese has been invited to rent his vessels. ("Politiken," Nov. 14, 1967.)

East Germany

DELIVERS TRAWLERS TO DENMARK

Two Danish fish exporters in Skagen have received the first in a series of steel trawlers that will be delivered from East Germany in accordance with 1965 trade agreements. One of the exporters has ordered 12 steel side trawlers and 6 large stern trawlers. The other has contracted for 10 side trawlers. Vessels will be sold by the Danish exporters to fishermen.

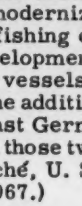
Side trawlers are 110 feet long, 175 GRT, with 678-hp. turbo-supercharging motor. Their speed about 11 knots. They can be mounted with power block and purse seine, have reversible propeller, and latest electronic devices. They will be manned by a

East Germany (Contd.):

crew of 6. One vessel cost 1.3 million kroner (about US$175,000). Some vessels to be delivered later will be higher priced.

Welcomed by Fisheries Ministry

The increase in large steel vessels is welcomed by the Danish Ministry of Fisheries, which has urged modernization of the fishing fleet. Two large fishing centers in Jutland spearhead this development: Hirtshals leads with 54 such newer vessels, followed by Skagen with 49. Most of the additional vessels to be delivered from East Germany will probably be divided between those two ports. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 26, 1967.)



USSR

EXPANDS SAURY AND MACKEREL FISHING OFF JAPAN

The Soviet Union began fishing for saury and mackerel off the northeastern coast of Japan in 1963. She has been steadily expanding her operations. In 1965, she sent three 10,000-ton motherships and about 20 catcher vessels; in 1966, one 15,000-ton and two 10,000-ton motherships accompanied by about thirty 100- and 300-ton catcher vessels. In 1967, she is operating 6-7 miles offshore of Hokkaido two 14,000-gross-ton motherships accompanied by twenty-six 300-ton catcher vessels. They are purse-seining for mackerel.

Japanese Fishermen Urge Countermeasures

In view of these expanding operations, the Japanese saury and mackerel fishermen are urging the Government to develop drastic countermeasures. They demand that Japan establish a 12-mile exclusive fishing zone. They claim that excessive fishing will nullify saury and mackerel fishing regulations established in Japan to adjust domestic supply and demand and deplete the resources. However, it is understood that the Government considers it premature to establish a 12-mile fishing limit. It believes such an action would have an adverse effect on the fisheries of Japan's northern waters (Okhotsk Sea, Bering Sea, and North Pacific Ocean). ("Minato Shimbun," Nov. 11, 1967.)

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TRAWLER REPORTED OFF JAPAN'S WEST COAST

A 1,200-ton Soviet stern trawler was reported in mid-November 1967 off western Japan, about 11 nautical miles off Hagi, Yamaguchi Prefecture. This is the first time that a Soviet fishing vessel has come so close to the west coast.

The local fishermen, alarmed by the Soviet trawler's presence in an area prohibited by Japanese law to offshore trawling to protect coastal fishermen, are asking the Fisheries Agency to develop measures to cope with the Soviet operations. They fear that full-scale Soviet fishing operations would threaten the existence of the coastal fisheries in western Japan. ("Shin Suisan Shimbun," Dec. 4, 1967.)

Spain

SHRIMP TRAWLER TO FISH OFF WESTERN CENTRAL AMERICA

A large Spanish trawler will be operating for several months off the west coast of Central America. The vessel is owned by Admiral M. Dominquez Macaya, owner of large fleets in Vigo and Cadiz, Spain. Efforts will be directed toward deep-water shrimp. The shrimp will be processed, packed in cartons, and frozen aboard ship. Incidental species also will be processed and frozen. The vessel has a freezer capacity of 250 tons. (Proyecto Regional de Desarrollo Pesquero en Centroamerica, "Boletin Informativo," Nov. 15, 1967.)

LATIN AMERICA

Mexico

FISHERIES PRODUCTION IS UP

Mexican fisheries production during the first eight months of 1967 was 14.5 percent ahead of comparable figures of a year earlier. Nearly all important species showed impressive gains. Total production for Jan.-Aug. 1967 was 151,483 metric tons, compared to 132,341 tons in 1966. Among leading species were sardines, 22,432 tons (up 53 percent); shrimp, 19,566 tons (up 8 percent); anchovy, 16,296 (up 74 percent). Gains also were made for skipjack, other tuna, and red snapper.

Shrimp Exports Ahead of 1966

Shrimp exports continued to remain far ahead of 1966. During Jan.-Aug. 1967, shipments were worth US$30,664,000, or 33.6 percent above the 1966 period; 1966 was 7.4 percent ahead of 1965's poor year. Shrimp ranked fifth among all Mexican exports during the first eight months of 1967. Heaviest shrimp production normally occurs during the last 4 months of the year. Reports from the Pacific Coast indicate that the season, which opened on Sept. 1, has been good so far. As of Oct. 20, exports were up 7 percent over last year. (Regional Fisheries Attaché, U. S. Embassy, Mexico City, Nov. 19, 1967.)

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FRENCH MAKE LARGE FISHERIES LOAN

A French loan of about US$35 million to develop Mexican fisheries, made in November 1967, will be used for exploratory fishing and to construct vessels and processing facilities. French vessels, with mixed French-Mexican crews, later to be replaced by all-Mexican crews, will conduct exploratory fishing, and prototype vessels to exploit any resources found will be built in France. More vessels will be constructed in Mexico, probably at Matzatlan, using French engines and equipment.

Three vessels were on their way from France in early November 1967, each with 2 French officers and fishermen. A 200-ton trawler will begin operating at Mazatlan; the other vessel will operate from Ensenada and from Progreso, Yucatan. Existing shore facilities will be used the first 6 months, and frozen fish will be produced for the domestic market. If experimental fishing and marketing justify them, additional vessels and processing facilities will be added. It is hoped that an export market in the U. S. and Europe will be created.

The operations will be based on those underway in Mauritania by the parent French company (Compagnie Internationale de Gestion et de Participation). The Mexicans will provide 5 percent of the financing; the remaining 95 percent will be loaned by the French for 9 years at 6¼ percent interest.

Loan A Result of Protocol

The loan follows the protocol negotiated in June 1967 and adopted by both governments. The protocol guarantees the agreement between the French company and Mexican fisheries interests. No specific sums are mentioned, nor number of vessels. The plan generally calls for French technical assistance and French vessels to fish several months to determine facilities and infrastructure needed to develop Mexican fisheries.

The Mexican delegation in June was headed by Octaviano Campos Salas, Secretary of Industry and Commerce; the French by Jean Morin, Secretary General of the Merchant Marine. Both delegations included industry and government representatives, including Jorge Echaniz, Mexican Director of Fisheries. The negotiations were preceded by a visit to Mexico by French fishing experts. They decided then to limit development plans to the Pacific coast. The Mexicans, in turn, visited Mauritania later to view operations.

The agreement does not seem universally popular. Although the operation is described as strictly private enterprise, both French and Mexican governments will supervise it. Some Mexican participating companies are government owned. Some private entrepreneurs claim they will be unable to take advantage of the opportunity because they have

Mexico (Contd.):

lost control to fishermen's co-ops. Conversely, the co-ops are reported to view the arrangement as a threat to their domination. (Last summer, Campos Salas reassured both sides that both would profit from the deal.) Also, during the period between the protocol's negotiation and approval, when it was uncertain either government would approve, Echaniz reportedly sought a similar deal with Spanish interests to provide assistance being sought from the French. Both sides have good records, however, and informed observers say the venture has a better-than-even chance of success.

The following Mexican facilities will be utilized: at Ensenada, Guillermo Mejia will use several plants of Empresa Rodriguez; at Preoreso, Alberto Solis will use his freezing plant; at Mazatlan, Antonio Cevallos will use his freezing plant, Refrigeradora Mexicana, in partnership with Tomas de Rueda of Astilleros Unidos del Pacifico, a shipyard.

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REPORT ON MAZATLAN'S FISHING VESSEL CONSTRUCTION

The largest shipyard on Mexico's Pacific Coast, Astilleros Unidos del Pacifico, S.A., of Mazatlan, is operating at about 30 percent of capacity. Most of the output is steel fishing vessels for export. The yard had to turn to the foreign market because the domestic fishing industry virtually ceased ordering new vessels. Although very successful, the yard had difficulty showing a profit. The plant now is a government operation with the original management.

In recent years, the shipyard built and exported shrimp trawlers and purse seiners to Kuwait, Pakistan, Brazil, Chile, and Venezuela. Recent contributions to the Mexican fleet include a kelp harvester and a tuna purse seiner for Ensenada, and a shrimp trawler for Mazatlan. Completed, but unsold, are 3 purse seiners--two ordered by Chilean interests who could not pay when anchovy fishery slumped.

Vessels in the Works

Work underway includes: Five 73-foot shrimp trawlers for a Japanese company in Surinam; two 73-foot shrimp trawlers for Venezuela (the second order, and for a second purchaser); two 67-foot shrimp trawlers for Brazil, for 2 different companies, and follow several shipments; one 67-foot shrimp trawler for Mazatlan; one 300-ton tow-boat for PEMEX--identical to 3 others being built in Veracruz and 2 under construction in Tampico.

The shipyard has built a small landing-craft-type boat as a shrimp pick-up carrier in the lagoon fishery. This shallow-draft boat can carry 5 tons at 25 knots, and is powered with an inboard-outboard.

The yard anticipates orders for 10 more vessels from Japan, and 30 trawlers per year from the Cooperative Bank.

The Mazatlan Vessel

The vessel being built for Mazatlan is of particular interest. It is identical, except in one respect, to the sistership delivered to the National Bank for the Development of Cooperatives in October 1967. These are the first 2 large steel trawlers added to the Mexican shrimp fleet in many years and the first to have all-brine refrigeration. The fiberglass brine tanks were built by an affiliated yard. Until now, the Mexican fishery failed to follow the lead of all other shrimp fleets and so the boats are all ice refrigerated. Another innovation is that both boats are equipped with shipboard reduction plants for manufacturing fish meal from incidental or scrap fish taken while fishing for shrimp. The plants are built by Productos Marinos Industrializados, S.A., an affiliate of the Cooperative Bank. As with vessels built for export, all steel is Mexican; the winches, hoists, etc., are manufactured in Mazatlan by Rice Hermanos. The first of these two trawlers is powered by a U. S.-built engine. So were all fishing vessels previously built by Astilleros Unidos. The vessel under construction has the first Rolls Royce engine to be assembled in Mexico. The engine reportedly contains 20 percent Mexican components and 80 percent British. The new Rolls Royce assembly plant will increase Mexican components to 30 percent in 1968, and 70 percent in 5 years. If successful, this engine will constitute serious competition for the universally popular U. S. engine.

Boatbuilding Costs High

Mexican boatbuilding costs are rather high because of higher prices for material and

Mexico (Contd.):

import taxes on engines and other equipment. The Mexican yards can compete with Japanese yards only because of lower transportation costs to the user in Surinam. It costs US$5,000 to sail a trawler from Mazatlan to Paramaribo with a Mexican crew, versus $20,000 for shipment from Japan. For the export market, the price of a completely equipped 73-foot steel trawler is $90,000. This is $5,000 less than the domestic delivery price because of a rebate on all import taxes on machinery and equipment and a 15 percent discount on domestic materials, which are granted as export incentives. Further, export credit terms are for 9 years at 6½ percent, whereas domestic credit is for 4 years at 11 percent. The encouragement of exports results in higher prices to local fishermen, who continue to use obsolete boats.

Adjacent to Astilleros Unidos is an associated but privately owned boatyard, Kessler-Rueda, S.A. de C.V. This yard, operated and partly owned by the large yard's manager, produces fiberglass fishing boats and pleasure craft. It specializes in 26-foot canoes, most used in the lagoon fishery for shrimp, and some for shark gill-netting. They can carry 1½ tons of shrimp or fish. Most are outboard powered, but some have small inboard diesels. Kessler-Rueda has sold 280 of these "pangas" during the past 5 years. Now it is starting to build 28-footers with 2½-ton capacity. This plant also builds fiberglass tender boats and seine skiffs for steel seiners and trawlers, and brine tanks for the new trawlers mentioned above. It also manufactures fiberglass truck fenders for Kenilworth.

The Mazatlan shipbuilding complex is rounded out by its affiliated but separately owned machine shop and a Volvo Pentax sales and service operation. (Regional Fisheries Attaché, U. S. Embassy, Mexico, Nov. 28, 1967.)

* * *

NATIONALIZATION OF FISHING INDUSTRY POSSIBLE

Following a series of recent moves, the Mexican Government-controlled National Bank for the Development of Cooperatives (Banco Nacional de Fomento Cooperativo, BANFOCO) has become the dominant force in the fishing industry. In addition to gaining control of the west coast shrimp industry, BANFOCO is entering fish meal production and fish canning. It is able to expand further if it wishes. This dominance is exemplified below.

Shrimp

On the west coast, BANFOCO dominates production, processing, and export to the U.S. and Japan. Mexican law says shrimp may be fished only by co-op fishermen. The co-ops are controlled through BANFOCO's control of operating funds, etc. Traditionally, the Bank has controlled the inshore fishery, with co-ops owning vessels. Co-ops are now expanding their hold on the high-seas fishery. They are buying up privately owned trawlers and expanding control to where private owners complain of difficulty in making a profit.

Control of production is falling exclusively to BANFOCO. Also, it owns 9 of 19 Pacific shrimp packing plants, with 66 percent of total freezing capacity. It controls Crest Importing Company and Ocean Garden Products, Inc., which handle shrimp from all BANFOCO plants, plus 6 independent plants. This leaves only 4 small plants open to other importers.

Fish Canning, Meal Production

In October 1967, BANFOCO bought into Empresas Rodriguez, gaining control of 7 plants in Baja California and half interest in another. Facilities include the largest fish cannery and fish meal plants in Mexico, the largest purse seine fleet (sardine, mackerel, and tuna), plus repair facilities.

The Gulf of Mexico

On the Gulf, BANFOCO is not as dominant, but it is growing. The complex at Alvarado is boosting shrimp production and is building nineteen 85-foot, all-weather, deep-water trawlers to exploit offshore resources; 35 more vessels are being considered.

On the west coast, 30 new vessels per year are planned for an indefinite period. Also, co-ops enjoy exclusive right to harvest valuable species other than shrimp, including lobsters, abalone, and oysters. All lobsters taken in Baja California are marketed through BANFOCO. (Fisheries Attaché, U. S. Embassy, Mexico, Dec. 10, 1967.)

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Mexico (Contd.):

FISH MEAL AND TURTLE PROCESSING PLANTS OPEN

New fish meal and turtle processing plants began operations in Mexico in November 1967. The two plants are located together in San Blas, Nayarit, on the Gulf of California. They represent an investment of US$118,000 and will provide 105 new jobs. The fish meal plant is Harinas del Pescado del Pacifico, S. A. Of the $100,000 invested in it, $66,000 will be used for machinery and equipment, $8,000 for nets, $10,000 for two large barges, and $16,000 for a fishing vessel. The plant employs 68 and can produce 4 tons of fish meal and 700 liters of oil daily. All production will be shipped to Mexico City, to a firm of the same name, to be processed further and marketed. The principal investors are Alfonso Sanchez Dalvos and Manuel Corenzo; Corenzo will serve as manager.

Turtle Plant

The turtle plant, which will use some facilities of the fish meal plant, employs 37 and has a capacity of 500 turtles daily. All parts of the turtles will be used--meat, oil, hides, and eggs. The plant's main backer is Frandelli, S. de R. L. Investment is $18,000: $2,000 for plant equipment, $14,800 for 5 boats, and $1,600 for 2 motor vehicles. (U. S. Consulate, Mazatlan, Dec. 7, 1967.)

Argentina

PROMULGATES LAW REGULATING FOREIGN FISHING

The long-awaited law controlling foreign fishing in the 200-mile territorial sea proclaimed in January 1967 was published in the "Boletin Oficial," Nov. 24, 1967. It followed close upon the October 1967 fisheries promotion law that provided, among other things, that fish within 12 miles be reserved for Argentine fishermen.

The new law, Argentine Decree No. 8802, provides: (1) Foreign vessels now fishing must register within 60 days. (2) Each foreign vessel must buy a license and a permit. The license fee is US$500, the permit US$10 per net registered ton. The rates are double for factory and freezerships. The license is good for a year, the permit for 120 days. (3) An agent legally accredited and responsible for the conduct of a vessel must be present in Argentina. (4) Conservation regulations issued by Argentina must be observed. (5) Sale in Argentina of foreign-caught fish is prohibited, except by special permit. (6) Vessels must report positions each day, plus dates of entering and leaving zone of Argentine jurisdiction. (7) Notice of transshipments of fish must be given to Argentine authorities, offering an opportunity to inspect; items and quantities transshipped must be recorded and transmitted to the Government. (8) The vessels must comply with provisions of the Convention on Safety of Life at Sea. (9) Vessels with valid permits and licenses may buy supplies, fuel, etc., at Argentine ports and may employ Argentine crewmen. (10) Fines for violations shall vary between US$5,000 and US$100,000, to be determined by the maritime authorities. In certain instances, gear may be seized and vessels detained. (U. S. Embassy, Buenos Aires, Dec. 13, 1967.)

Note: The U. S. and several other nations have officially protested the Argentine 200-mile claim. An unofficial translation of the law is available from BCF's Branch of Foreign Fisheries.

Chile

FISH MEAL PRODUCTION DECLINES

The Chilean fish-meal industry will show a decrease in production and exports of fish meal, fish oil, and sales in 1967. The reasons: (1) total fish catch in northern Chilean waters will be lower (present estimate, 700,000 metric tons of anchoveta) than in 1966 (1,070,719 tons), and (2) average export price per ton, f.o.b. Chilean ports, has dropped considerably ($115 a metric ton) from 1966 ($160 a ton). Present-day levels are running at around $100 a ton f.o.b.

Financial Difficulties

Overexpansion in the fish-meal industry during 1964 and 1965 is now resulting in numerous bankruptcies and other financial difficulties. This situation resulted in government sponsored reorganization of the industry with a series of mergers, shut downs, and liquidations.

Chile (Contd.):

The current make-up of the industry is:

Zone	1966 Plants	1967 Plants	1966 Tot. Plant Cap.	1967 Tot. Plant Cap.
	. . . (No.) . . .		. . . (Tons/Hr.) . . .	
Arica to Taltal	38	17	1,320	690

The Anchoveta Vessels

In December 1966, anchoveta vessels registered in northern Chile (omitting tuna vessels and small sardine boats) were reliably estimated at 224, with a total hold capacity of 30,009 tons. In November 1967, comparable figures are 120 vessels, with a total hold capacity of 17,185 tons. The latter two figures are based on vessels believed capable of fishing. (U. S. Embassy, Santiago, Nov. 17, 1967.)

Honduras

REPORT ON FISHING INDUSTRY

The only truly developed fishery in Honduras is the shrimp industry on the Caribbean Coast. Four freezing plants and their trawler fleets are the fishery. Practically all production is exported to the U. S. The shrimp plants also pack frozen lobsters for export.

The two largest and most modern plants are located at Guanaja, a small town on a coral key close to Guanaja Island. The inhabitants of Guanaja, like those of the other Bay Islands, speak English. They consider themselves Bay Islanders rather than Hondurans. The men are excellent watermen. Many serve as crewmen on local shrimp trawlers and on U. S.-based trawlers that fish offshore. Others serve the merchant marines of many nations.

Until the two shrimp plants were built, the money sent home by the seamen was Guanaja's main source of income. The new plants have absorbed all available labor on the island; additional workers have been brought over from the mainland. The local people call their home Bonacca, the English rendition of Guanaja.

The Two Plants

The larger plant is Industria Pesquera Hondureña, owned and operated by a Spaniard named Daniel de Solabarrieta. He also owns and operates sardine and fruit canneries in Mexico. The plant is improved and expanded constantly and rates with the best in Latin America. It is housed in a modern concrete plant on the key's shore, adjacent to a marine terminal for petroleum products. It was started about 6 years ago and was intended originally to freeze lobster. Two years ago, it was realized the lobster resource is limited, and that shrimp would prove more profitable. Since then, the facilities have been greatly expanded.

Like other successful operations in isolated locations, the Guanaja plant is completely self contained: its own electric power plant, ice making machinery, freezers, cold storage, net loft, spare parts depot, etc.

The other Guanaja plant is Caribbean Producers, located on a tiny key close to the village. It is a joint operation of Adam Smith and Alberti Seafoods of the U. S. and "Kirk" Kirkconnell of Guanaja. Somewhat smaller, it is equally modern and well equipped. It also is self contained. The parent company operates freezer ships to transport production to the U. S. Most of the pack is individually quick frozen peeled and deveined.

The Fleet

The fleet serving Industria Pesquera Hondureña consists of 25 trawlers. Eleven of these are U. S. flag vessels owned by Sam Tringali of Florida. These are all modern trawlers with standardized equipment to facilitate maintenance. As is usual with a distant-based fleet, the owner or a top representative is on hand to supervise. The other 14 trawlers are old and new boats, flying the flags of Honduras, the U. S., and Panama. Some are company boats. The plant owner plans to expand the fleet to 50 trawlers. He has 7 new steel vessels under construction in Veracruz, Mexico; the remainder will be built locally or be brought in from the U. S. (U. S. Embassy, Mexico, D.F.)

ASIA

Japan

CANNED SALMON AND CRAB EXPORTS HIT BY POUND DEVALUATION

Devaluation of the British pound is expected to affect adversely Japanese canned salmon and crab exports to the sterling areas. Particularly hard hit will be exports of canned pink salmon and canned tanner crab to Great Britain, Australia, and New Zealand. About 58 percent of the 1967 canned pink salmon production already has been exported (over 40 percent was purchased by Great Britain). But the sale of the remaining 42 percent is expected to decline sharply as a result of devaluation. Exports of the 1967 canned red salmon production will present no problem because 90 percent of the pack already has been contracted for shipment to Great Britain at the previous exchange rate. Sales of canned tanner crab will be affected seriously since Great Britain is the principal buyer.

Fig. 1 - Part of Crab Fleet at Choshi (Boso Peninsula near Tokyo). (Photo: Edelsberg)

Fig. 2 - A large catch of crabs on the deck of a Japanese crab factoryship in the North Pacific.

Fig. 3 - Removing shell from processed crab meat aboard a Japanese crab factoryship.

Study Prices and Sales System

In view of these adverse effects, the Japan Canned Salmon and Crab Sales Company decided on November 20 to suspend temporarily all export sales, and to examine the need for revising the present price structure and sales system. Since Britain's aim in devaluing the pound is to expand exports and restrict imports, the company feels it is logical and essential that Japan seek to develop export markets in the dollar areas. ("Suisancho Nippo," Nov. 21, 1967.)

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REVIEW OF HAKE FISHING OFF U. S. PACIFIC NORTHWEST

There are 3 Japanese fleets licensed for experimental hake fishing in the eastern Pacific. One of them is the "Koyo Maru No. 2" (3,456 gross tons) factoryship fleet, which began fishing off the U. S. Pacific Northwest in late September 1967. Stormy weather ended fishing on October 25, cutting short by about 2 weeks the trip originally planned.

The second fleet--8 trawlers led by the factoryship "Kashima Maru" (7,163 gross tons)--is presently fishing off Washington.

Japan (Contd.):

The third fleet is expected to begin fishing around March or April 1968.

Test fishing by the first 2 fleets has revealed: (1) the hake fishing ground is narrow in width and extends from north to south; (2) the catch fluctuates widely; (3) the sea bottom in areas of hake concentration is rugged, causing severe gear damage; and (4) in October-November, the ocean often becomes very rough, hampering fishing.

Not Very Productive in Fall and Winter

They have found that the fishery off the U. S. Pacific Northwest during the fall and winter season was not very productive. This is because the hake migrate southward from the area off Vancouver Island to Baja California during September-November. The best fishing season would be the spring and summer months, when the hake begin migrating northward, and when weather, ocean, and sea bottom conditions are more favorable.

Japanese firms felt that the operation of 3 fleets would not adversely affect the resource. ("Suisan Tsuhin," Nov. 14, 1967.)

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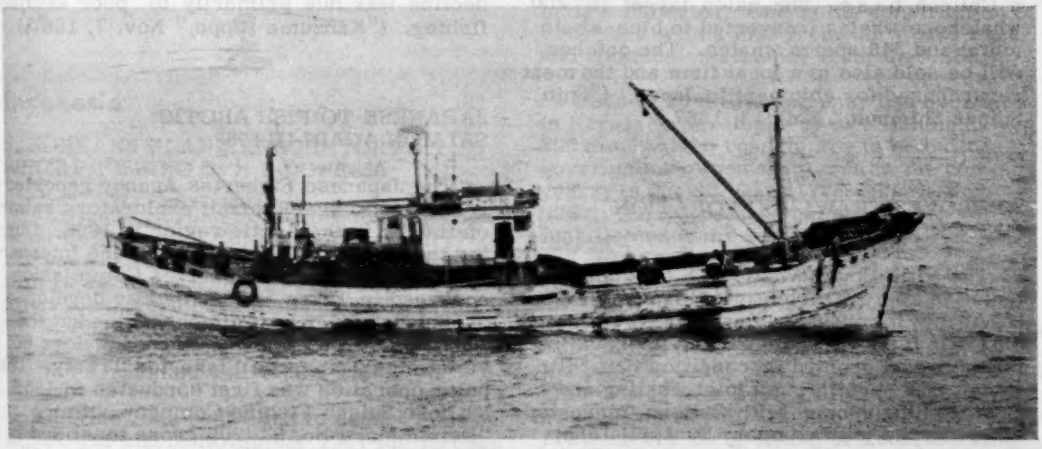
CATCH RISES FOR GULF OF ALASKA MOTHERSHIP TRAWL FLEET

Ten of the 11 Japanese mothership-type trawl fleets licensed to fish in the Gulf of Alaska in 1967 were operating there at the end of Oct. 1967. An 11th was scheduled to join them. It was the first time in 1967 that all 11 fleets were there.

Bottomfish Catch as of Oct. 22, 1967

	1967	1966
	(Metric Tons)	
Flatfish	1,000	400
Cod	2,000	600
Alaska pollock	6,000	4,500
Sablefish	5,000	3,000
Pacific ocean perch	73,000	50,000
Shrimp	1,000	500
Others	5,000	1,000
Total	93,000	60,000



A Japanese trawler fishing bottomfish for the mothership in Bering Sea.

Plan Based on FAO Report

Japan's plan to operate 3 fleets in 1967 was based on an FAO report on resource investigations. These indicated the estimated abundance of Pacific hake to be around 1.5-2 million tons, sufficient to support an annual harvest of 200,000-300,000 tons. The

Catches as of Oct. 22 were 93,000 metric tons of bottomfish, up 55 percent above 1966 landings; they consisted of over 75 percent ocean perch, indicating that species' abundance in the Gulf. In contrast, the 1967 Bering Sea bottomfish catch consisted of 75 percent Alaska pollock. ("Suisan Tsushin," Oct. 31, 1967.)

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Japan (Contd.):

LICENSES WHALING OFF PERU AND CHILE

The Japanese Fisheries Agency, on October 5, 1967, licensed Kinkai Hogei Whaling Co. to conduct exploratory whaling off Peru until April 25, 1968. The firm's fleet consists of 3 catcher vessels: "Hassho Maru," 623 gross tons, "Seki Maru No. 11," 473 gross tons, and "Shichisho Maru," 623 gross tons, and one scouting vessel, "Shoyu Maru," 198 gross tons.

The fleet departed Japan for Paita, Peru, on Nov. 4. Its catch target is 150 whalebone whales and 1,200 sperm whales. The catches will be sold to a Peruvian firm. The processed products will be bought back for export to Japan.

2nd Fleet Off Chile

On October 23, 1967, the Agency licensed another whaling firm, Nitto Hogei, to hunt whales off Chile until April 30, 1968. The firm plans to operate 5 whaling vessels from a Chilean base. The catch target is 200 whalebone whales (converted to blue-whale units) and 348 sperm whales. The catches will be sold also to a local firm and the meat repurchased for shipment to Japan. ("Shin Suisan Shimbun," Nov. 13, 1967.)

* * *

APPROVES TRAWL EXPLORATION OFF CHILE

The Nitto Hogei Whaling Co. has obtained tentative approval from the Japanese Fisheries Agency to conduct exploratory trawl fishing off Chile for hake and shrimp. Approval reportedly was granted on condition that Nitto Hogei, now negotiating a joint whaling and trawl fishing venture with Chilean interests, establish the joint company by April 1968. The trawlers could then operate under Chile's flag and so avoid complications that could arise from the latter's claim to 200-mile territorial waters, and other problems.

Nitto Hogei has chartered two 300-gross-ton trawlers for exploratory operations east of 80° W. longitude. Also, it has chartered the freezership "Chichibu Maru" (7,477 gross tons) to serve as a floating cold storage. ("Shin Suisan Shimbun Sokuho," Nov. 4, 1967.)

* * *

YAIZU LANDINGS DOWN BUT VALUE UP

October 1967 landings at the leading Japanese tuna port of Yaizu totaled 10,577 metric tons worth about US$5.48 million, according to the Yaizu Fishery Cooperative Association. Compared with October 1966, landings were down 357 tons but up $1.18 million. The decline was due primarily to poor skipjack fishing. ("Kanzume Nippo," Nov. 7, 1967.)

Landings and Average Exvessel Prices

Product	Quantity			Average Price		
	1967		1966	1967		1966
	Oct.	Sept.	Oct.	Oct.	Sept.	Oct.
	. . . (Metric Tons) . . .			. (US$/Short Ton)		
Tuna:						
Bluefin[1/] . .	4,873	3,674	4,056	718	720	584
Albacore . .	630	691	731	474	464	464
Skipjack . .	2,792	2,534	4,500	287	275	199
Mackerel . . .	1,467	989	771	93	83	90
Others	815	811	876	-	-	-
Total . .	10,577	8,699	10,934	-	-	-

1/Includes yellowfin and big-eyed tuna.

* * *

JAPANESE TO FISH ARCTIC SALMON AGAIN IN 1968

The Japanese Fisheries Agency reportedly intends to again permit exploratory salmon fishing in the Arctic region in 1968. During the recent annual meeting of the International North Pacific Fisheries Commission convened in Tokyo, a controversy developed over Japanese polar salmon fishing but the Agency's view is that the operation does not violate the Tripartite Fisheries Treaty. The polar operation was first conducted in 1966 by Hoko Suisan Fishing Company with the "Dairin Maru No. 8" (200 gross tons) and in 1967 with the larger "Dairin Maru No. 10" (300 gross tons) but the results in both expeditions were disappointing, with about 80 metric tons of salmon (mostly chums) caught in the first trip and about 86 tons in the second trip. ("Shin Suisan Shimbun," November 20, 1967.)

* * *

Japan (Contd.):

RAISE ASSESSMENTS
ON TUNA EXPORTS

The Japan Frozen Tuna Producers Association, which conducts its business with funds obtained from assessments levied on tuna exports, is facing increasing difficulties in managing its finances owing to the sharply reduced revenue caused by depressed tuna exports this year. The Association's data show that fresh and frozen tuna exported during March-September 1967 totaled 64,956 short tons, over 50 percent less than the organization's projection of 145,000 tons of exports for that period. Therefore, to increase its revenue so as to provide uninterrupted service, the Association has raised the assessments on tuna exports as follows (per metric ton): frozen tuna (other than skipjack) in round, dressed, or gilled & gutted--24 cents (up 5 cents), fillets--37 cents (up 7½ cents), loins and discs--49 cents (up 2½ cents); frozen skipjack in round, dressed, or gilled & gutted--12 cents (up 2½ cents), loins and discs--25 cents (up 5 cents). ("Nihon Suisan Shimbun," Nov. 10, 1967.)

日本

Indonesia

S. KOREANS PLAN EXPLORATORY
SHRIMP FISHING OFF INDONESIA

The South Korean Sinhung (Shinko in Japanese) Cold Storage Co. plans exploratory shrimp fishing in Indonesia off Java Island with 10 shrimp trawlers. The vessels (120 gross tons) were built in Japan with part of the US$90 million non-Government credit provided by Japan under the economic cooperation agreement with South Korea.

The fleet was scheduled to depart Pusan around the end of November 1967 for its base at Jakarta. Catches reportedly will be sold to Japan. ("Suisan Keizai Shimbun," Nov. 15, 1967.)

India

SHRIMP AND SHRIMP PRODUCTS
EXPORTS INCREASED

The latest available figures on Indian shrimp and shrimp products exports--from "Indian Seafoods," The Marine Products Export Promotion Council, Ernakulam, vol. IV, no. 4, 1967--are:

Product	1966		1965	
	Quantity	Value	Quantity	Value
	Metric Tons	US$ 1,000	Metric Tons	US$ 1,000
Frozen	8,783.5	11,683.0	7,028.1	5,450.0
Canned	1,523.3	2,454.8	1,148.0	1,250.7
Powder	81.7	7.3	104.0	8.8
Meal	-	-	2.0	0.2
Bits	3.0	0.7	-	-
Pickles	1.8	1.6	0.9	0.4

* * *

PROJECTS ARE UNDERWAY
TO DEVELOP FISHERIES

Projects are underway, or are in the planning stages, to develop several aspects of India's fisheries. One is the construction of 8 harbors with a loan from the World Bank and technical assistance from the USSR.

US$5 to $6 million already has been spent in Kerala to develop deep-sea fishing. Over 800 mechanized vessels are to be built in government-owned shipyards in the coming years; in recent years, 785 vessels were built. Refrigeration equipment soon will be installed on some vessels.

Kerala Looks to Deep-Sea Fishing

The Kerala State Government is preparing a master plan to exploit deep-sea fishing. At the present time, only 10 percent of the available resource is being utilized. Other plans include the organization of fishermen's cooperatives and the granting of Federal subsidies to fishermen. ("Seafood Trade Journal" 1967).

South Korea

BUYS NORWEGIAN FACTORYSHIP

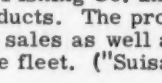
The Norwegian factoryship "Bataan" has been sold to a South Korean firm. It was delivered to the new owners Nov. 28, 1967, and renamed "Shin Hung." The vessel has a complete 2-line canning plant (cap. 10 tons an hour); reduction plant (25 tons a day); and freezer handling 100 tons a day. Cold-storage rooms have 2,900-ton capacity. Storage is available for 400 tons of fish meal, 200 tons of fish oil, and 2,500 tons of canned fish. The Shin Hung has a 32-man crew and up to 400 factory workers. (U. S. Embassy, Oslo, Dec. 1, 1967.)

Taiwan

PLANS TUNA SALES COMPANY IN AMERICAN SAMOA

Taiwan, which operates over 80 tuna vessels out of American Samoa, reported plans to establish on Samoa a sales company. It would be financed jointly by the Taiwanese Government and the fishing industry.

At present, tuna landings of the Samoa-based Taiwanese fleet are sold through the Japanese Taiyo Fishing Co. and the Formosan Marine Products. The proposed company would take over sales as well as supply procurement for the fleet. ("Suisancho Nippo," Nov. 4, 1967.)



Taiwanese and S. Korean Tuna Exports Through Japanese Traders Increasing

Formosan and South Korean tuna exports transacted through Japanese trading firms are increasing yearly. They totaled 15,000 short tons in 1966. By Oct. 31, 1967, they had reached close to 20,000 tons. By species the 1967 exports were: albacore 11,671 tons, yellowfin 6,103 tons, and big-eyed 2,040 tons, totaling 19,814 tons. Most of these exports went to the U. S. Albacore export handled by Japanese firms during this period compares with 20,343 short tons of Japanese albacore validated for direct export to the U. S. during April-September 1967.

Principal Japanese sellers for Taiwanese and S. Korean tuna producers are the trading firms Nichimen, Mitsui Bussan, Toshoku, and C. Itoh & Co., and the fishery firms Taiyo Gyogyo and Kaigai Gyogyo. ("Suisancho Nippo," Nov. 6, 1967.)

Indian Ocean Tuna Fishing Drops

Tuna fishing in the Indian Ocean was good until late August 1967, then suddenly began declining in September. The albacore catch, which averaged 3-4 metric tons a vessel a day off Mauritius Island and Madagascar until August, declined sharply in October-November. Therefore, tuna vessels moved northward in the western Indian Ocean towards Seychelles Islands, where they were fishing in mid-November for yellowfin. Even in that area, catches were averaging under 2 tons a day.

155 Vessels in W. Indian Ocean

Tuna vessels operating in the western Indian Ocean numbered around 155 vessels: 60 Japanese, 80 Taiwanese, and 15 South Korean. Tuna fishing in the Indian Ocean, especially by Taiwan, is increasing steadily, although the Japanese fleet, which numbered 80-100 vessels a few years ago, is dwindling gradually. Some Japanese believe Indian Ocean tuna are being overfished. ("Suisan Tsushin," Nov. 7, 1967.)

AFRICA

South-West Africa

TIGHTENS FISHERY ENFORCEMENT

The South-West African Administration will buy 2 patrol vessels and an airplane to strengthen its protection of the Territory's fishing industry. This increased enforcement reportedly will be used primarily against South African factoryships and fishing craft that stray into South-West African fishing grounds. (U. S. Consulate, Cape Town, Nov. 17, 1967.)

Nigeria

NEW SHRIMP VENTURE

The West African Development Corporation Ltd. (WADC) is planning to begin shrimp fishing off the Nigerian coast in the near future. Formed in January 1964, WADC has been inactive until now. It owns 2 fishing trawlers, now in Abidjan, which have been adapted for shrimp fishing. It has arranged to lease 10 trawlers and a mothership from Norway and Denmark. Berthing space has also been secured at the Ijora landing in Lagos.

The company used its 2 trawlers to survey the Nigerian coastal waters for shrimp beds in 1964. The managing director estimates that in the initial stages of the operation--with 6 boats at sea at one time--the catch could reach an annual rate of 150 metric tons. Shrimp fishing will begin as soon as arrangements are made with U. S. importers. (U. S. Embassy, Lagos, Nov. 19, 1967.)

* * *

NORTHERN NIGERIA PRODUCES OVER HALF NATION'S TOTAL CATCH

An estimated 30,000 tons of fish annually, more than half Nigeria's total fish production, comes from the northern part of the country. Much of the North's output is concentrated in Lake Chad, an international lake at the northeast corner of Nigeria. The lake extends into Chad, the Cameroons, and the Niger Republic.

Many fishermen also work the country's 2 large rivers, the Benue and the Niger. Sometime in 1968, the completion of the Niger Dam will create a lake--and more fishing.

Northern Nigerians do not eat much fish. Most of the catch is transported south to areas where fish is an important part of the diet.

Plans to Aid Fishing

There are regional, federal government, and international programs in the North to upgrade the fishing industry and to increase production, especially on Lake Chad. The emphasis is on improved methods and more efficient means of processing and marketing.

The potential for increasing fish catch on Lake Chad seems considerable, and fishing in the other 3 lake-shore nations is only at the beginning stages. Research relating to a regional fisheries project covering the 4 lake-shore countries has begun under the sponsorship of the UN and the Chad Basin Commission. (U. S. Consulate General, Kaduna.)

Senegal

CANOE-TYPE BOATS CATCH 80-85% OF FISH

The fishing industry is important to Senegal's economy--though the chances for growth are not favorable at the present time. The industry contributes about 3 percent of the gross domestic product, 10-12 percent of export cannings, and employs an estimated 25,000 people. Sardinella make up 20-40 percent of the total catch. Almost all of Senegal's processed fish is exported to France.

Fishing is largely "traditional." About 80-85 percent of all fish landed in Senegal are caught by small, canoe-type boats ("pirogues") operating close to shore. One-third of the pirogues are powered by outboard motors that may be bought without paying domestic customs duties. The boats carry 2-6 fishermen and are equipped with handlines and/or small nets.

Most of the catch is sold fresh in local markets without industrial processing. There are no refrigerated trucks to carry fresh fish to the interior. Only Dakar and a few large interior cities have cold storage facilities. (U. S. Embassy, Dakar.)

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CAVIAR CROWN

1 jar (4 ounces) salmon caviar

1 jar (3-1/2 ounces) whitefish caviar

2 packages (8 ounces each) cream cheese, softened

2 tablespoons lemon juice

2 tablespoons chopped green onion

1 teaspoon Worcestershire sauce

Parsley

Assorted party breads or melba toast

Drain caviars. Cream the cheese and seasonings. Place cheese mixture in center of a serving plate and shape in a circle about 7 inches in diameter and 1 inch thick, similar to a layer cake. Cover a 4-inch circle in the center with salmon caviar. Cover the remaining $1\frac{1}{2}$ inches on top and the sides with whitefish caviar. Place small sprigs of parsley around edge of salmon caviar. (A ring of overlapping slices of tiny stuffed olives or a ribbon of cream cheese put through a pastry tube may be substituted for the parsley.) Garnish base of cheese mixture with parsley. Serve with party breads or melba toast. Makes approximately 2 cups of spread.

Note: For large parties, fix several small crowns using $\frac{1}{2}$ recipe for each one. Divide cheese mixture in half and make two cheese circles about $3\frac{1}{2}$ inches in diameter and 1 inch thick. Cover a 2-inch circle in center of each with salmon caviar and remaining outside edges with whitefish caviar. Proceed as directed above.

This idea for entertaining is from a 22-page, full-color booklet, Nautical Notions for Nibbling, released by the United States Department of the Interior's Bureau of Commercial Fisheries. It is available for 45 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

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Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

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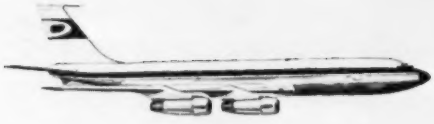
EXPORTS



Fresh Frozen Canned Fishery Products

Have you thought of expanding your present markets by making your fishery products available for overseas sales?

If you wish to enter the growing export market, your products can be promoted at food trade fairs and U.S. Trade Centers in many foreign lands.

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Contact us and give your products the foreign exposure that makes sales.